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THE
H I S T O R Y
OF THE
ROYAL SOCIETY of LONDON
FOR IMPROVING OF
NATURAL KNOWLEDGE,
FROM ITS FIRST RISE.

IN WHICH

The most considerable of those Papers communicated to the
SOCIETY, which have hitherto not been published, are inserted in their
proper order,

AS A SUPPLEMENT TO

THE PHILOSOPHICAL TRANSACTIONS.

By THOMAS BIRCH, D.D.

SECRETARY to the ROYAL SOCIETY.

VOL. I.

*Talem intellige PHILOSOPHIAM NATURALEM, quæ non abeat in fumos speculationum subtilium
aut sublimium, sed quæ efficaciter operetur ad sublevanda vitæ humanæ incommoda. BACON de
Augm. Scient. L. ii. c. 2.*

L O N D O N:
Printed for A. MILLAR in the Strand,
MDCCLVI. J.



TO THE
K I N G.

S I R,

A Former Work with this title had the honour of being introduced to the world under the protection of one of your Majesty's Royal Predecessors, the FOUNDER of the SOCIETY, whose History that Work began. The present performance, intended to prosecute the same design, presumes **therefore**, with the greater confidence, to offer itself to Your MAJESTY, the P A T R O N of that SOCIETY; a title, which you were pleased, soon after your accession to the throne, to add to your name in their Charter-book, **where**-in you had before subscribed it as a MEMBER. Your MAJESTY's regard for that learned body is founded upon your thorough conviction of the importance of Experimental Philosophy and real Science to the interest of every Nation; and how much the cultivation of them has raised the reputation of your own kingdoms. And, in consequence of this, your MAJESTY had

DEDICATION.

no sooner received an application from the Society in favour of the Royal Observatory, than you granted a very considerable sum for an additional building, and a complete apparatus of instruments; and shortly after took occasion, by an ample and unsolicited pension, to reward the distinguished merit of your astronomer.

THESE, Sir, are topics, which have a peculiar propriety before a Work of the kind now presented. Civil History will claim, as her province, the other more illustrious Acts of your MAJESTY, for the instruction and emulation of succeeding Princes. But duty as well as inclination engage me to embrace this opportunity of declaring my grateful sense of that happiness, which, for the greater part of my life, I have enjoyed, in common with all your subjects, under your MAJESTY's wife, just, and amiable government. I know I express their united wishes, when I add my own, for the long continuance of your MAJESTY's health and reign.

I am,

S I R,

Your MAJESTY's most humble,

most faithfull,

and most devoted subject,

London,
10 November,
1755.

THOMAS BIRCH.

T H E

P R E F A C E.

THOUGH the design of continuing the HISTORY OF THE ROYAL SOCIETY from the year 1667, in which that of bishop SPRAT was published, can want no apology, if the execution of it shall in any measure correspond with the dignity of the subject; yet as the present work professes to trace it back through a period, which has been already treated of by that excellent writer, it will undoubtedly be expected of me to premise the grounds of that part of my undertaking.

Admired as his performance is in general, especially the review contained in it of antient and modern philosophy, and the defence and recommendation of experimental knowledge, the great object of the Royal Society; the earliest and ablest members of that body*, as well as their successors, still wished, that the account of its institution and progress had been more full and circumstantial in the narration of the facts related by him, and enlarged by inserting many others of equal importance, which were omitted; and that the order of time, in which they occurred, had been more exactly marked.

This consideration, added to the motives of gratitude for the honour done me by the Society in electing me one of their secretaries, and of zeal for the interest of science in general, induced me to attempt the compiling from the original journals, registers, letter and council-books both a supplement to bishop SPRAT's *History*, and a continuation of it, illustrated with many other particulars relating to the subject from manuscript and printed authorities, with the addition of the most important papers communicated to the Society, which have not yet been published. And of these there is no inconsiderable number, as the PHILOSOPHICAL TRANSACTIONS were not begun till March 1667, about four years after the Society's journals and register-books commence; and as the publication of those TRANSACTIONS

* See Mr. BOYLE's Works, vol. v. p. 325 and 367.

was

THE PREFACE.

was discontinued for four years from January 167 $\frac{1}{2}$ to January 168 $\frac{1}{2}$, though supplied in some measure by Mr. HOOKE'S PHILOSOPHICAL COLLECTIONS; and for three years from December 1687 to January 169 $\frac{1}{2}$, besides other smaller interruptions amounting to near one year and a half more, before October 1695, since which time the TRANSACTIONS have been regularly carried on. The whole is digested into a chronological order, as most proper for ascertaining the origin and improvements of the several discoveries in nature and inventions of art, and for doing justice to the claims of their respective authors.

The two first volumes are now offered to the public, from whose candor I hope, that industry and fidelity, the most essential qualifications in a work of this kind, will atone for the want of that beauty of style, copiousness of imagination, and force of eloquence so eminent in the great prelate already mentioned; which were indeed more necessary in his time for vindicating the institution of the Society from the clamors of ignorance, prejudice, and bigotry, than they are in this more sober and enlightened age for representing the detail of its performances, the plainest account of which is perhaps preferable to the most elaborate ornaments.

No fact has been omitted, which appeared to me important in itself or by its connexion with others, that are so. The failure of experiments is recorded as well as their success. And I have been not in the least solicitous to suppress, in the earlier part of this work, some few traces of false though received opinions; since it will be found, that the mention of them in the Society was generally followed by so strict and judicious an examination of them, as ended in their confutation. My great aim has indeed been to give the history of the ROYAL SOCIETY the extent due to so copious a subject, as it is in fact the history of philosophy in the last and present age. And the account, which I have added towards the close of every year, of the most eminent members, who died in it, is a small tribute to the memory of those men, to whose genius and labours the Society owes its glory, and the public the various improvements of real science and the most useful knowledge.

THE

T H E
H I S T O R Y
O F T H E
ROYAL SOCIETY of LONDON,
FOR IMPROVING OF
N A T U R A L K N O W L E D G E,
F R O M I T S F I R S T R I S E.

THE rise of the Royal Society is traced by Dr. SPRAT* no higher than *some space after the end of the civil wars*; the scene of the first assemblies of the learned men, who laid the foundation of it, being fixed by him in the university of Oxford at the lodgings of Dr. JOHN WILKINS in Wadham College. But we may go still farther back for the origin of this excellent institution, upon the authority of Dr. JOHN WALLIS, one of its earliest and most considerable members. It was, according to his account^b, about the year 1645, that several worthy persons residing in London, who were inquisitive into natural, and the new and experimental philosophy, agreed to meet weekly on a certain day, to discourse upon such subjects^c. Among these were Dr. JOHN WALLIS, Dr.

Dr.

* History of the Royal Society, part ii. p. 53. edit. 1767.

^b Dr. WALLIS's account of his own life, in the preface to Mr. THOMAS HEARNE's edition of PETER LANGSTON's chronicle, vol. i. p. 161.

^c It is evident from hence and from other authorities and facts, that Monsieur DU HAMEL was very ill-informed in the following passage of his *Regie scientiarum academice historia*, lib. i. cap. 2. § 12. p. 8. edit. Paris 1698, in 4to. *Sub finem dominationis OLIVARII CROMVELII complures viri*

Vol. I.

scholares, quibus & hæc discipline cordi erant, quibus magna ex parte Galliam & Italiam peragrarent, atque evaditorum catus apud D. D. MONTMOR & THEVENOT interfuerant, Oxonii una convenerunt, qui de rebus physicis inter se conferrent, & varia facerent experimenta. Præterquam enim earum disciplinarum, quas in dies præcipui cercabant, studio testantur, illud quoque vel maximum accolebat, quod legitime suo regi addidit minus tutum invideretur domi sua quietos agere, quasi præfuit veram flatu minus contenti opportunum tempus tyranni jugum ex-

B

cutienti

Dr. JONATHAN GODDARD, then candidate, and afterwards fellow of the college of physicians, Dr. GEORGE ENT, Dr. FRANCIS GLISSON, and Dr. CHRISTOPHER MERRET, doctors in physic; Mr. SAMUEL FOSTER, professor of astronomy in Gresham College; Mr. THEODORE HAAK, a native of the Palatinate in Germany, who first gave occasion to, and suggested these meetings; and many others. The assemblies were held sometimes at Dr. GODDARD's lodgings in Woodstreet, on account of his keeping an operator in his house for grinding glasses for telescopes; sometimes at a convenient place in Cheapside, and sometimes in Gresham College, or in the neighbourhood of it. The business was, precluding affairs of state and questions of theology, to consider and discuss philosophical subjects, and whatever had any connection with, or relation to them, as physic, anatomy, geometry, astronomy, navigation, statics, magnetism, chemistry, mechanics, and natural experiments, with the state of these studies, as then cultivated at home or abroad.

This assembly seems to be that mentioned under the title of the *Invisible or Philosophical College* by Mr. BOYLE in some letters of his written in 1646 and 1647^a.

About the years 1648 and 1649 the company, who formed these meetings, began to be divided; Dr. WILKINS being appointed warden of Wadham College on the 13th of April 1648^a; Dr. WALLIS, Savilian professor of geometry in June 1649^b; and Dr. GODDARD, warden of Merton College, 9th of December 1651^c. Those in London continued to meet there as before; and the Oxford members joined them, as often as business or inclination brought them to the metropolis. The latter, in conjunction with Dr. SETH WARD, then Savilian professor of astronomy, and afterwards successively bishop of Exeter and Salisbury, RALPH BATHURST, M. D. afterwards president of Trinity College and dean of Wells, Dr. WILLIAM PETTY, Dr. THOMAS WILLIS, then an eminent physician at Oxford, and divers others, continuing their assemblies in Oxford, brought the study of natural and experimental philosophy into fashion there, meeting at first in Dr. PETTY's lodgings, in the house of an apothecary, for the convenience of inspecting drugs, &c. as there was occasion. After his departure in September 1652^d to Ireland, they met, though not so constantly as before^e, at Dr. WILKINS's apartments in Wadham College; and, upon his being made master of Trinity College in Cambridge, whither he removed in September 1659^f, in the lodgings of the honourable Mr. ROBERT BOYLE, who had come to

eritendi expectarent. Ea ratione minus posse periculosa COMYELLII de se iurisdictionem, si his iudiciis se derent, qua tranquillitatem animi & securitatem populantis. The learned historian has committed here a gross mistake in fixing the time of the first meetings of the English philosophers so late as the latter end of OLIVER CROMWELL's government, and assigning as one cause of their application to philosophical studies the view of avoiding his jealousy of their ill affection to him; whereas the fact is, that they had begun their meetings eight years before he assumed the power of protector. Nor is it true, what Monsieur DU HAMEL asserts, that *most* of them had, before they formed themselves into a society at Oxford, travelled into

France, and been present at the assemblies of learned men at Monsieur MONTMOR's and Monsieur TRAVENOT's at Paris.

^a The life of the honourable ROBERT BOYLE, p. 66, 67, and 78. edit. London, 1744, in 8vo.

^b Weoon, *Arch. Oxon.* vol. ii. fol. 505. 2d. edit.

^c *Id. Hist. & Antiq. univers. Oxon.* lib. ii. p. 42.

^d WARD's lives of the professors of Gresham College, p. 270.

^e *Ibid.* p. 218.

^f Dr. PETTY, in a letter to Mr. BOYLE, from Dublin, Feb. 17, 1652^g, has these words: "I have not heard better news, than that the club is restored at Oxford." See Mr. BOYLE's works, vol. v. p. 298.

^g *Ibid.* p. 466.

Oxford

Oxford in the latter end of June 1654, and resided there for the most part till April 1668, when he settled in London¹.

The greatest part of the Oxford society coming to London about the year 1659², they usually met at Gresham College at the Wednesday's lecture upon astronomy by Mr. CHRISTOPHER WREN, at the Thursday's upon geometry by Mr. LAURENCE ROOKE; where they were joined by WILLIAM lord viscount BROUNCKER, WILLIAM BRERETON, esq; afterwards lord BRERETON, Sir PAUL NEILE, JOHN EVELYN, esq; THOMAS HENSHAW, esq; HENRY SLINGESBY, esq; Dr. TIMOTHY CLARKE, Dr. ENT, WILLIAM BALLE, esq; ABRAHAM HILL, esq; Mr. (a'fterwards Dr.) WILLIAM CROUNE, and divers other gentlemen, whose inclinations lay the same way.

They continued their custom of meeting once, if not twice, a week in term-time, till they were scattered by the public distractions of that year 1659, and the place of their meeting was made a quarter for soldiers³.

Their meetings were revived, and attended with a larger concourse of persons, eminent for their characters and learning, upon the restoration, 1660⁴; and, as appears from the journal book of the Royal Society⁵, on the 28th of November that year, the lord viscount BROUNCKER, Mr. BOYLE, Mr. BRUCE, Sir ROBERT MORAY, Sir PAUL NEILE, Dr. WILKINS, Dr. GODDARD, Dr. PESTY, Mr. BALLE, Mr. ROOKE, Mr. WREN, and Mr. HILL, after the lecture of Mr. WREN at Gresham College, withdrew, for mutual conversation, into Mr. ROOKE's apartment, where, amongst other matters discoursed of, something was offered about a design of founding a college for the promoting of physico-mathematical experimental learning. And because they had these frequent occasions of meeting with one another, it was proposed, that some course might be thought of to improve this meeting to a more regular way of debating things; and that, according to the manner in other countries, where there were voluntary associations of men into academies for the advancement of various parts of learning, they might do something answerable here for the promoting of experimental philosophy.

In order to this, it was therefore agreed, that the company would continue their weekly meetings on Wednesdays, at three of the clock in the afternoon in term-time, at Mr. ROOKE's chamber in Gresham College, and in the vacation at that of Mr. BALLE's in the Temple: and that, towards the defraying of occasional expences, every one should, at his first admission, pay down ten shillings; and be-

¹ Life of Mr. BOYLE, p. 109.

² Dr. SPRAT p. 57, says, 1658, and p. 58, that the society continued to meet at Gresham College, till they were scattered by the miserable distractions of that fatal year, the place of their meeting being made a quarter for soldiers. But he has evidently mistaken the year 1658 for 1659, in which these distractions happened after RICHARD CROMWELL had resigned the protectorship in May of the latter year; nor was Gresham College possessed by the soldiers till October following, as appears from a

letter of Mr. MATTHEW WREN to his cousin Mr. CHRISTOPHER WREN then at Oxford, dated the 25th of that month, and printed in the *Paratitula or memorials of the lives of bishop WREN*, &c. part i. app. which letter must have been written in 1659, as it mentions likewise serjeant BRADSHAW as going into another world, who, according to WHITLOCK's Memorials, p. 686, died on the 31st of that month.

³ Dr. SPRAT, p. 57, 58.

⁴ Dr. WALLIS, *ubi supra*.

⁵ Vol. i. p. 1.

sides, engage to pay one shilling weekly, whether present or absent, whilst he should please to keep his relation to the company.

At this meeting, Dr. WILKINS was appointed to the chair; Mr. BALLE to be treasurer; and Mr. CROUNE, though absent, was named regifter.

And to the end that they might the better be enabled to make conjecture, of how many the elected members of the society should consist, it was desired, that a list might be taken of the names of such persons, as were known to those present, and judged by them willing and fit to be joined with them in their design; and who, if they should desire it, might be admitted before any others.

Upon which the following catalogue was offered:

| | |
|--------------------|-------------------------|
| Lord HATTON | Dr. ENT |
| Mr. ROBERT BOYLE | Dr. SCARBURGH |
| Mr. JONES | Dr. FRAZIER |
| Mr. COVENTRY | Dr. COXE |
| Mr. BRERETON | Dr. MERRET |
| Sir KENELME DIGBY | Dr. WHISTLER |
| Sir ANTHONY MORGAN | Dr. CLARKE |
| Mr. JOHN VAUGHAN | Dr. ^s COWLEY |
| Mr. EVELYN | Dr. WILLIS |
| Mr. RAWLINS | Dr. HENSHAW |
| Mr. MATTHEW WREN | Dr. FINCH |
| Mr. SLINGESBY | Dr. BAYNES |
| Mr. HENSHAW | Mr. CHRISTOPHER WREN |
| Mr. DENHAM | Mr. SMITH |
| Mr. POVEY | Mr. ASHMOLE |
| Mr. WYLDE | Mr. NEWBURG |
| Dr. WARD | Mr. AUSTEN |
| Dr. WALLIS | Mr. OLDENBURG |
| Dr. GLISSON | Mr. PETT |
| Dr. BATE | Mr. CROUNE. |

At the next meeting, on the 5th of December, 1660, Sir ROBERT MORAY brought word from the court, that the king had been acquainted with the design of the meeting, and well approved of it, and would be ready to give an encouragement to it.

The following orders were then made, that Mr. WREN be desired to prepare against the next meeting for the pendulum experiment:

That Mr. CROUNE be desired to look out for some discrete person, skilled in short-hand writing, to be an amanuensis: And

^s He had been created doctor of physic at Oxford, 2d December, 1657. WOOD, Fasti Oxon. vol. ii. col. 120.

That

That it be referred to the lord viscount Brouncker, Mr. Boyle, Sir Robert Moray, Dr. Petty, and Mr. Wren, to prepare some questions, in order to the trial of the quicksilver experiment upon Teneriffe.

It was likewise agreed, that the number of members should not be increased, but by consent of the society, who had this day subscribed their names, till the orders for the constitution should be settled.

The form of subscribing was in the following words :

“ We, whose names are underwritten, do consent and agree, that we will meet together weekly, (if not hindered by necessary occasions) to consult and debate concerning the promoting of experimental learning: and that each of us will allow one shilling weekly towards the defraying of occasional charges: provided, that if any one, or more, of us shall think fit at any time to withdraw, he, or they, shall, after notice thereof given to the company at a meeting, be freed from this obligation for the future.”

It was farther agreed, that any three or more of the company, whose occasions would permit them, should be desired to meet as a committee at three of the clock on the Friday following, to consult about such orders, in reference to the constitution of the society, as they should think fit to offer to the whole company; and so to adjourn from day to day.

The society meeting again on the 12th of December, it was referred to the lord viscount Brouncker, Sir Robert Moray, Sir Paul Neile, Mr. Matthew Wren, Dr. Goddard, and Mr. Christopher Wren, to consult about a convenient place for the weekly meeting of the society.

It was then voted, that no person should be admitted into the society, without scrutiny, except such as were of, or above, the degree of baron :

That the stated number of the society be fifty five :

That twenty one of the said number be the *quorum* for elections :

That any person of, or above, the degree of baron might be admitted as supernumeraries, if they should desire it, and would conform themselves to such orders, as were or should be established:

And it having been suggested at the committee appointed at the preceding meeting, that the college of physicians would afford convenient accommodation for the assemblies of the society, upon supposition, that it were granted and accepted of, it was thought reasonable, that any of the fellows of the said college, if they should desire it, be admitted likewise as supernumeraries, upon condition of submitting to the laws of the society, both as to the payment on their admission and the weekly allowance, and the particular works or tasks, that should be allotted to them.

It was also agreed, that the public professors of mathematics, physick, and natural philosophy of both universities, should have the same privilege with the college of physicians, on the same condition of paying the admission fee, and contributing their weekly allowance and assistance, when their occasions permit them to be in London.

The following regulations were likewise resolved upon :

That the quorum of the society be nine for all matters, except the business of election.

Concerning the manner of elections :

That no person be elected the same day, on which he is proposed.

That at least twenty one members be present at each election.

That the amanuensis provide several little scrolls of paper of an equal length and breadth, in number double to the members present. One half of these to be marked with a cross, and the other with cyphers ; and both being rolled up, to be laid in two distinct heaps. Every person then coming in his order shall take from each heap a roll, and throw which he shall please privately into an urn, and the other into a box. After which, the director, and two others of the society, having openly numbered the crossed rolls in the urn, shall accordingly pronounce the election.

That if two thirds of the members present do consent upon any scrutiny, that election be good, and not otherwise.

Concerning the officers and servants of the society :

That the standing officers of the society be three, a president or director, a treasurer, and a register :

That the president be chosen monthly.

That the treasurer continue one year ; as also the register.

That there be likewise two servants belonging to the society, an amanuensis, and an operator.

That the treasurer give in every quarter an account of the stock in his hand, and all disbursements made, to the president or director, and any three others to be appointed by the society ; who are to report this account to the society.

That any bill of charges brought in by the amanuensis and operator, and subscribed by the president and register, for any experiment made, and subscribed by
the

the curators of that experiment, or the major part of them, be a sufficient warrant to the treasurer for the payment of that sum.

That the register provide three books, one for the statutes of the society and names of its members; another for experiments, and the result of debates; and a third for occasional orders.

That the salary of the amanuensis be forty shillings a year, and his pay for particular business at the ordinary rate, either by the sheet, or otherwise, as the president and register should best agree with him.

That the salary of the operator be four pounds a year; and for any other service, as the curators, who employ him, shall judge reasonable.

That at every meeting, three or more of the society be desired to be reporters for that meeting, to sit at the table with the register, and take notes of every thing of importance, that shall be offered to the society, and debated in it; and that they together form a report against the next meeting, to be filed by the register.

That when the admission money shall amount to twenty pounds, a stop be made at that sum.

At this meeting Sir KENELME DIGBY, JOHN AUSTEN, esq; and Dr. GEORGE BATE were chosen by vote into the society.

On the 19th of *December*, WILLIAM BRERETON, esq; and Sir WILLIAM PER-SAL were proposed as candidates to be put to the scrutiny at the next meeting.

The resolutions of this day were :

That the next meeting should be at Gresham College, and the future ones continued there weekly, till a farther resolution should be taken.

That Dr. PETTY and Mr. WREN be desired to consider the philosophy of shipping, and to bring in their thoughts about it to the society.

That every member be likewise requested to bring in to a committee, to be appointed for that purpose, such experiments, as he should think fit for the advancement of the general design of the society.

That Dr. WILKINS, and as many of the professors of Gresham College, as were members of the society, or any three of them, be a committee for the receiving of all such experiments.

And that Mr. WREN bring in his account of the pendulum experiment, with his explanation upon it, to be registered.

December 26, Dr. GODDARD was added to Dr. PETTY and Mr. WREN for the experiments about shipping; and Sir KENELME DIGBY was desired to afford them his assistance: and they were requested to communicate to the society some experiment at their next meeting.

Mr. BOYLE, Mr. HENRY OLDENBURG, Mr. JOHN DENHAM, Mr. RAWLINS, Mr. ELIAS ASHMOLE, Mr. JOHN EVELYN, and NATHANIEL HENSHAW, M. D. were proposed as candidates for election.

166?, January 2, the lord viscount Brouncker was desired to prosecute the experiment of the recoiling of guns, and to bring it in at the next meeting.

Mr. BOYLE was likewise requested to bring in his cylinder, and to shew at his best convenience his experiment of the air; as Dr. MERRET was to bring in the history of refining; Dr. GODDARD his experiments of colors; and Dr. PETTY the diagrams of what he had discoursed to the society that day, and the history of building of ships.

The candidates, proposed at this meeting, to be put to the scrutiny at the next, were EDMUND WALLER, esq; Dr. CHARLES SCARBURGH, PETER PETT, WILLIAM COVENTRY, — RAWLINSON, and DANIEL COLWALL, esqrs.

On this day were entered into the register-book of the society the following questions, propounded by the lord viscount Brouncker and Mr. BOYLE, according to an order of the society of the 5th of December, and agreed upon to be sent to Tentrific.

1. "Try the quicksilver experiment at the top, and at several other ascents of the mountain; and at the end of the experiment upon the top of the hill, lift out the tube from the restagnant quicksilver somewhat hastily, and observe, if the remaining mercury be impelled with the usual force or not. And take by instrument, with what exactness may be, the true altitude of every place, where the experiment is made; and observe, at the same time, the temperature of the air, as to heat and cold, by a weather-glass; and as to moisture and dryness, with an hydroscope; and note what sense the experimenters have of the air at those times respectively.

2. "Carry up bladders, some very little blown, some more, and others full blown; and observe, how they alter upon the several ascents.

3. "Take up a satera, two balls of like substance, differing in weight or bigness, and an open empty bottle, to the highest part of the hill, and there stop the bottle exactly well; and then weigh thar and the balls (each severally) with the satera there, and at the several ascents, and also below; and likewise the bottle again, filled with the air below, and stopped as before, noting the different weight of the stopper, if not exactly the same.

! Vol. i. p. 1.

4. "Try

4. " Try by an hour-glass, whether a pendulum clock goes faster or slower on the top of the hill than below.

5. " Try the force of a stone-bow, or other spring, both above and below, and note well the difference.

6. " Make the experiment of two flat polished marbles upon one another with a weight hanging at the lower, and carefully note the greatest weight, that may be applied on the top of the hill, and also below.

7. " Try whether birds, that fly heavily, or others clogged with as much weight as they can well fly with below, can fly as well, better, or worse above.

8. " Observe what alterations are to be found in living creatures carried thither, both before and after feeding: and what the experimenters do find in themselves as to difficulty of breathing, faintness of spirit, inclination to vomit, giddiness, &c.

9. " Try to light a candle with a match, and fire some spirits of wine; and observe, if they burn upon the top of the hill as well as below; and of what figures, colours, &c. the flames are.

10. " Fire powder in a fusée, or otherwise; observe the manner of firing, the force of the powder, the motion of the smoke, and the duration of it: the like of other combustible things, as to flame, smoke, &c.

11. " Carry up a vial of aqua fortis, or other smoky liquor, and there open it, and observe, whether the fumes ascend as much as they do below. Quench lime at the top of the hill, and observe the degree of heat, and duration of it, in respect to the like quenched below.

12. " Observe, whether any vapours fasten in little drops to the outside of a vessel filled with snow and salt, and try the experiment of freezing with it.

13. " Carry to the top two or three bright pieces of iron or copper, and observe there, whether the air doth cause any beginning of rust in them.

14. " Take some of the snow, that lies the highest upon the mountain, up to the top (if it may be) and observe what alteration is made upon it by the air.

15. " Try whether a filtre or siphon will bring over liquors as well on the top of the hill as below.

16. " Observe the difference of sounds made by a bell, watch, gun, &c. on the top of the hill, in respect to the same below.

VOL. I.

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17. " Ob-

17. " Observe diligently by a quadrant or double horizontal, what variation the same needle hath both above and below.

18. " Look upon the stars (or the letters of a book at some certain distance) with a perspective, as well above as below, the air being clear; and observe accurately the best distance of the glasses in each place.

19. " Try if any difference may be found above in things to be smelt or tasted, from what they had below.

20. " Make an exact narrative of every thing observable upon it; as where it is earthy, sandy, gravelly, rocky, &c. What caves, precipices, windings and turnings, &c. What living creatures, plants, &c. And send over a little of every remarkable vegetable, that may be found thereon.

21. " Repeat the experiments, if conveniently they may, at both the solstices and equinoxes.

22. Observe accurately the time of the sun's rising on the top of the hill and below; and note the difference."

January 9. Dr. GODDARD was desired to bring in writing his experiments of colours, and to produce what he had done with relation to the anatomy of trees:

Mr. ROOKE to provide tubes and quicksilver for the quicksilver experiment: And

Mr. EVELYN to shew his catalogue of trades.

Dr. MERRET was continued for the business of refining:

The order about reports was revived.

Mr. WYLDE, DANIEL WHISTLER, M. D. and WILLIAM HOLDER, D. D. were proposed as candidates.

January 16. The king sent two load-stones by Sir ROBERT MORAY, with a message, that he expected an account from the society of some of the most considerable experiments upon them.

The trial of these experiments were referred to Mr. BALLE.

The lord viscount BOUNCKER was desired to prosecute his experiments of the recoiling of guns.

Dr. GODDARD exhibited the following paper, which was ordered to be registered¹.

¹ Register-book, vol. i. p. 3.

" *A brief*

" *A brief experimental account of the production of some colours by mixture of several liquors, either having little or no colour, or being of different colours from those produced.*

" A MILKY WHITE COLOUR is produced by the mixture of spirit of wine impregnated with any resinous gum, as mastic, white benzoin, &c. with fair water: for which purpose the most transparent and crystalline gums are most advantageous.

" The like is also produced upon much beating or agitation of water and oil together, upon the same account, in all probability, though not so white or permanent.

" Likewise in preparing of emulsions, which are made by contusion of oily kernels or seeds, as almonds, melon-seeds, &c. in distilled waters or other convenient liquors. The whiteness also of milk consisting of parts oleose, as the butter, and aqueose, as the whey, seems to be upon the same account.

" The like milky white is also produced in the precipitation of some metals dissolved in their proper menstrua; as in the solution of mercury in aqua fortis cast into brine, for making white precipitate; in distilled vinegar impregnated with lead, cast into alum-water; in the oil of antimony cast into fair water. The solution of coral turning white upon addition of oil of tartar seems to have affinity hereto; which may be reduced to transparency by addition of distilled vinegar in a competent quantity, which is the first dissolvent. Transparent solid bodies powdered, as glass, sugar-candy, &c. seem to change white upon the same account.

" BLUE is produced by mixture of the tincture of galls in a small proportion with lime-water; whereof the former is of a brown or high colour like strong drink, and the latter clear as rock water.

" YELLOW is produced in the precipitation of a solution of mercury in aqua fortis with oil of tartar; as white was mentioned before to be in the precipitation of the fume in brine.

" Also in the preparation of turbith mineral, the mass of mercury dissolved in oil of vitriol, and exhaled to dryness, being of a grey or ashy colour, upon the first touch of lime-water for dulcoration, turns to a beautiful yellow, which it retains ever after.

" GREEN is produced by the mixture of the solution of Hungarian vitriol, which is of a beautiful blue colour, and lime-water (which hath no more colour than fair water) added to it.

" A FRESH CRIMSON RED may be induced upon a tincture of red roses, that hath utterly lost its proper colour, and is become only brown or high coloured like
C 2 " strong

“ strong drink, by addition of a little oil or spirit of vitriol, falt, or aqua fortis.
 “ By addition of a little oil of tartar or spirit of harts-horn to this tincture, so
 “ heightened with oil of vitriol, it turneth green. Oil of vitriol being again
 “ dropped in, reduceth the red colour, though with some disadvantage as to the
 “ beauty, evenness, and transparency. In preparing an infusion of clove gilly-
 “ flowers in simple water, some of the liquor being taken out before it had to sense
 “ gotten any of the tincture, but was like other water, upon dropping in a little
 “ oil of vitriol, it shewed a perfect pink or carnation red.

“ BLACK is produced by the tincture of galls and solution of vitriol mixed to-
 “ gether; both which are transparent, and neither necessarily of any intense colour;
 “ as in the making of ordinary ink, which consists of no other considerable ingre-
 “ dient except gum, to prevent too much sinking into paper, and to give it some
 “ gloss. Hence, if one write with either of these liquors, upon which the letters
 “ appear little or nothing, and wet the writing with the other, it appears plain
 “ and legible. Oil of vitriol, falt, or aqua fortis mixed, discharges this blackness,
 “ and renders the liquor transparent. Whence also these liquors take out blots or
 “ writing on paper. Oil of tartar superadded renders the liquor opaque, and re-
 “ duceth the blackness, though with disadvantage of intenseness and evenness.”

The catalogue of trades brought in by Mr. EVELYN, and that of Dr. PETTY, were referred to them and Dr. MERRET, to be compared, methodised, and returned to the society.

Dr. HOLDER, Dr. SCARBURGH, Mr. WALLER, Mr. COVENTRY, Mr. WYLD, Mr. PETT, and Mr. COLWALL, were put to the scrutiny, and elected.

Dr. MERRET was requested to bring in writing that account of refining, which he had delivered in discourse this day.

The lord viscount Brouncker, Mr. BOYLE, Sir ROBERT MORAY, Sir PAUL NEILE, Mr. ROOKE, Mr. WREN, Mr. BALLE, Dr. CLARKE, and Mr. HILL, were appointed a committee to draw up an account of the quicksilver experiment.

Mr. EVELYN was desired to bring in an history of engraving and etching: And.

Dr. PETTY to communicate the history of some trade at his own choice.

Dr. GODDARD was continued for the anatomy of wood.

It was ordered, that the members of the society belonging to Gresham College, together with Sir ROBERT MORAY, and as many others as thought proper, be a committee for magnetical experiments.

January 23, the lord viscount Brouncker was desired to continue his experiments of recoiling.

Mr. EVELYN to communicate his observations of the anatomy of trees :

Sir KENELME DIGBY to bring in writing his discourse made this day concerning the vegetation of plants.

Dr. PETTY to deliver in his thoughts concerning the trade of clothing at the next meeting.

Mr. SLINGESBY to communicate his remarks upon the business of the mint : And

Mr. WILDE to shew the experiment of the stone kindled by wetting.

Col. TUKE, WILLIAM HAMMOND, esq; Dr. QUATREMAINE, Dr. TWISDEN, Dr. WALTER CHARLETON, and Sir NICHOLAS STEWART, were proposed as candidates.

It was resolved, that no more be proposed, till it be known, whether any of those, who were first named, and not in the list, were desirous of being admitted into the society or not; and that their particular acquaintance be requested to learn their minds in that respect.

January 30, being the day of fast and humiliation for the death of king CHARLES I. there was no meeting of the society. But on the 29th of that month Mr. EVELYN wrote the following letter to Dr. WILKINS concerning the anatomy of trees¹, which subject had been referred to him at the preceding meeting.

“ SIR,

“ Though I suppose it might be a mistake, that there was a meeting appointed
“ (being a day of public solemnity in the church) yet because I am uncertain, and
“ that I would not disobey your commands, I here send you those trivial obser-
“ vations of mine concerning the anatomy of trees, and their vegetative motion.

“ It is certain, as Dr. GODDARD has excellently shewn, that a section of any
“ tree made parallel to the horizon will by the closeness of the circles point to-
“ wards the north; and so consequently, if a perpendicular be drawn through
“ them for the meridian, the rest of the cardinals be found out. But this is yet
“ not so constant and universal, but that where strong reflections are industriously
“ made, as from walls, the warm fumes of dung-hills, stores, &c. especially if the
“ southern aspect of the sun be intercepted, &c. these elliptical and hyperbolical
“ circles may sometimes become very irregular, or so, as I doubt not but by some
“ art they might be made to have them as orderly as those, which we find in Brasil
“ and ebony, which are almost concentric by reason of the uniform motion of the
“ sun about them in the country, where these trees grow. This doubtless is the
“ cause of the greater dilatation on the south part only with us, where the parts
“ are less confipated and more open. The consideration whereof (though no

¹ Letter-book, vol. i. p. 46.

“ where,

“ where, that I know of, for that reason mentioned) made the poet*, giving advice concerning transplanting, to direct, as of old they did,

“ *Quin etiam cal: regionem in cortice signant:*

“ *Ut, quo quaque modo steterit, qua parte calores*

“ *Austrinos tulerit, que terga obver: erit axi,*

“ *Resistant: adeo in teneris consuefcere multum est.*

“ Which though PLINY neglect as a curiosity unnecessary, I can by much experience confirm to be most useful; and that not one tree of a thousand would miscarry (the season and mould well qualified) were this rule more constantly observed, having in some made trial of it even at midsummer. But what I would add (for all this is little to what was said) is touching the cause of the grain of woods, which, in brief, I take to be from the descent rather than ascent of moisture. For what else becomes of that water, which we so frequently find in the cavities lodged, where many branches spread themselves, and shoot out at the tops of great trees, especially pollards, unless (according to its natural appetite) it sink into the very belly of the stem? e. g. You shall observe in the walnut tree, when it is very old, that the wood of it is rarely figured, waved, and marbled as it were; for which reason it is much more esteemed by joiners, &c. than the young, which is white, and without any considerable grain. The cause of these I conceive to be the distilling of the rain along the branches, where many of them emerge in clusters together, both in the head and sides of the stem: for there it rests, sinks in, and following the tenor of the pores, is the cause of these marks. Now that this wood is exceedingly replete of pores, do but plane off a thin chip from one of these old walnut trees, and hold it between the eye and the light, and it will soon convince you, that there is a passage sufficient for the water, which I pretend to sink into them. But above all, conspicuous for these works and damaskings is the maple, a finer sort whereof the Germans call *Aire*, and therefore much esteemed by our instrument-makers. It is notorious, that this tree is full of branches, which dart from the stem, from the root to the very summit, by reason that it spends itself not much in fruit. These branches then being often cut, the head becomes the more surcharged and furnished with them; which spreading like so many rays from a center form that cavity at the top of a stem, whence they shoot, which is the receptacle for the water, when at any time it rains. Now this sinking into the pores (as before we shewed) is forced to divert its course, as it passes through the body of the tree, wherever it meets with the knot, that is, the roots of those side branches which we said were lopped off from the stem, because their roots not only penetrate very deep towards the heart and pith of the tree, but are likewise extremely hard and impervious. It is the frequent obliquity of this course of the sinking waters, caused through these obstacles, which contributes to those curious undulations, and works so remarkable in this and other woods, whose branches either cluster at the top, or grow out collaterally, as maple and many other trees.

“ Sir, I know not whether I have well explained my conceptions in this hasty draught; but, such as it is, I make bold to offer, because it was commanded, as I

* VIRGIL, Georg. l. 2.

“ shall

" shall likewise that small, but (though I speak it) most exact treatise concerning
 " *Chalceography* *; the second part whereof, containing the mechanical, and indeed
 " most useful, I had so far destined to the press, as that there were four plates cut
 " of seventeen, which were to illustrate and adorn it. But fortuning on Thursday
 " day last to step into a shop of one, that sells prints, and there casually speaking
 " of my book, the master of the shop told me, that he had already prepared such
 " a treatise, being a translation of monsieur Bosse; that it was printed, and with-
 " in few days would be published.

" This being done by Mr. FAITHORNE, who is himself a skilful graver, I thought
 " might well take off your expectation of mine, which were collections out of
 " that author, with many additions, and a much less perplexed method. Mr.
 " FAITHORNE hath an earnest desire, that I would permit him to join my first
 " part (which is the historical, and greatly useful also) to his: but I do not think
 " it expedient, in respect the styles do much differ; and haply, when they shall be
 " both compared, the additions, which are considerable, may be thought fit to be
 " registered, if not the whole, as you shall conceive it worthy; for having not
 " perused his, I can yet make no judgment. In the mean time I proceed with
 " the first part, not because I am fond of it, but because I was long since engaged,
 " before I had the honour to serve this noble society. And when that is finished,
 " the printed paper, which I make bold to transmit to you in this (and which I
 " am likewise obliged to pursue) will, I hope, obtain your indulgence, not to expect
 " many other things from me till it be accomplished, but rather incite you to
 " contribute to my design such assistance, as your worthy self and the rest of our
 " noble society shall find it will require to render it useful and without reproach.
 " It is there, Sir, that I have at large discoursed of the generation of plants, and
 " upon that argument, which took up so much time at our last meeting: but it
 " shall not do so in this paper, which is at an end.

S I R, I am

Sav's Court,
 Jan. 29, 1662.

Your most obedient

and faithful servant,

J. EVELYN.*

February 6. A committee was appointed for considering of proper questions to be inquired of in the remotest parts of the world. It consisted of the lord viscount BRONCKER, Sir ROBERT MORAY, Mr. COVENTRY, Dr. PETTY, Dr. GODDARD, Mr. HENSHAW, Dr. WHISTLER, Mr. ROOKE, Mr. BOYLE, Mr. WILKINS, Mr. POVEY, Mr. EVELYN, Dr. CLARKE, Mr. AUSTEN, Mr. OLDENBURG, and Mr. COLWALL. They were to meet on the Monday following at Gresham College.

It was then directed to be inquired, whether Dr. WALLIS, Dr. WILLIS, Dr. FRAZIER, Dr. BATHURST, Dr. FINCH, Mr. SMITH, Mr. JONES, Mr. VAUGHAN, Mr. NEWBURN, and Dr. BAYNES desired to be of the society.

* It was published in 1662 in 8vo. under the title of *Sculptura; or the history and art of Chalceography*. It was reprinted at London in the present year 1755, in 8vo.

Dr.

Dr. GODDARD seems this day, though there is no entrance of it in the minutes, to have communicated a paper, which was registered the day following*, intitled,

Some observations concerning the texture and similar parts of the body of a tree, which may hold also in shrubs and other woody plants.

The lord viscount BOUNCKER was still continued for the experiment of recoiling of guns, and desired to try that, which was offered by Sir ROBERT MORAY concerning the plug; as Mr. EVELYN was to pursue the experiment about the grain of trees; and Dr. PETTY to give directions to Mr. BARLOW for the drawing of such schemes, as were proper for his discourse about clothing.

Mr. SLINGSBY was continued on the subject of the mint; and the lord viscount BOUNCKER and Mr. BOYLE for the quicksilver experiment, &c.

February 13. The committee for foreign inquiries was appointed to meet on the Monday following, at three in the afternoon.

The Danish ambassador visited the society, being introduced by Mr. EVELYN, and was entertained with experiments on Mr. BOYLE's air-pump, &c.

The experiment of the compression of water, was directed to be tried by Dr. WILKINS and Dr. PETTY.

The earl of SANDWICH was admitted into the society; and Dr. FRANCIS GLISSON and Dr. ABRAHAM COWLEY were now proposed as candidates, and ordered to be put to the scrutiny the next day.

February 20. Mr. EVELYN was desired to prepare oil of sulphur for the experiment of its weight and bulk; Dr. PETTY to bring in writing the experiment of the coppels; Dr. WHISTLER, Mr. POVEY, and Mr. HILL, their snake-stones; and Dr. MERRET an appendix to his paper on the art of refining†, about cementation and the antimony stone.

February 23. Experiments were made at the Tower of London, on the weight of bodies increased in the fire; an account of which being drawn up by the lord viscount BOUNCKER was registered*, and afterwards printed†.

* Register-book, vol. i. p. 5. It is printed in Mr. EVELYN's Sylva, b. iii. ch. 3. p. 233. 4th edit. London 1706, fol.

† It was entered Feb. 22, 1667, in the Register-book, vol. i. p. 8. and is printed in the

Philosophical Transactions, vol. xi. n^o 142. p. 1046.

* Register-book, vol. i. p. 14.

† Dr. SPRAT's history of the Royal Society, p. 228.

February

February 25. It was resolved, that the amanuensis attend every meeting-day, and set down such things as the society shall think proper; and that his annual salary be increased from two to four pounds:

That the members, who have been employed to make extracts out of several authors for the drawing up inquiries in foreign parts, be a committee for collecting such particulars as are most fit for that purpose:

That it be referred to Mr. ROOKE and Mr. CROUNE to consider the particulars of the meetings of the society till that time:

That the essay of the coppels made at the Tower be registered:

That an essay-furnace be built, and an accurate beam be provided for the use of the society.

Sir ROBERT MORAY was desired to communicate in writing an account of the bernacles.

Sir HENRY BLOUNT, bart. and Dr. WALLIS, were proposed as candidates.

March 4. The king sent by Sir PAUL NEILE five little glass bubbles, two with liquor in them, and the other three solid, in order to have the judgment of the society concerning them.

Sir WILLIAM PERSALL communicated the following experiment:

"Take an handful of the powder of roman vitriol; put it into a gally-pot in a pint of water: put in two or three small irons the length of a span, and three or four times a day constantly stir the water and powder, and move not the irons at all, but let them stand constantly in, night and day; and within the space of three weeks there will be crufted about the irons, as far as they are in the water, a substance purer than copper, which you may take off, and it will be malleable."

March 6. Sir ROBERT MORAY was chosen president.

Sir HENRY BLOUNT, bart. Col. SAMUEL TUKE, Dr. WALLIS, Dr. GLISSON, and Dr. COWLEY^b were elected into the society.

The amanuensis having provided the glass-bubbles, which he had been ordered to prepare, they succeeded in the same manner with those sent by the king.

^b He published about this time his *Proposition for the advancement of experimental philosophy. Dedicated to the honourable society of Greyham College.* Printed at London 1661, in 8vo. See Dr. WORTHINGTON's epistles to Mr. HARTLIS among his *Miscellanies*, p. 243, and bishop KENNET's Register and chronicle, p. 870. Dr. SPRAT, hist. of

R. S. p. 59, observes, that this treatise very much hastened the contrivance of the *propylia* of the royal society. The intent of the *propylia* of Mr. COWLEY was, that in some place near London there should be liberal salaries bestowed on a competent number of learned men, to whom should be committed the operations of natural experiments.

Some of these made for the society were ordered to be carried to the king by Sir PAUL NEILE; and that gentleman, the lord viscount BROUNCKER, Mr. SLINGESBY, and Mr. BRUCE, were appointed a committee to go to the glaſs-houſe at Woolwich, in order to inquire into the experiment of thoſe ſolid bubbles ſent by his majeſty.

Sir ROBERT MORAY having given in, probably this day, his relation concerning the bernacles, it was regiſtered^c on the 8th of *March*.

March 11. Sir WILLIAM PERSALL was deſired to bring in an account in writing of his obſervations on the load-ſtone.

Mr. JOHN VAUGHAN was propoſed as a candidate.

March 13. It was reſolved, that it ſhould be free for any member of the ſociety to have copies of any paper regiſtered, but not to communicate them to ſtrangers without leave of the ſociety, except it were his own paper.

Dr. THEODORE DE VAUX ſhewed ſome curious ſtones to the ſociety, and was propoſed as a candidate.

Mr. EVELYN produced *an exact relation of the Pico of Teneriffe, taken from Mr. CLAPPHAM*; which was regiſtered^d on the 29th of June 1661, and publiſhed afterwards by Dr. SPRAT^e, but with ſome difference in the form of it, and the omiſſion of ſeveral things. It appears from the original, that the journey to the *Pico* from Oratava was performed about the 20th of Auguſt 1646, by Mr. CLAPPHAM, together with Mr. PHILIP WARD, Mr. JOHN WEBBER, Mr. JOHN COWLING, Mr. THOMAS BRIDGE, and Mr. GEORGE COVE, *all of them conſiderable merchants and worthy of credit*; and that the *judicious and inquiſitive* man, who had lived twenty years in the iſland of Teneriffe, was Dr. PUGH, *a perſon of very great reputation* in London at the time of the communication of this account by Mr. EVELYN.

Sir ROBERT MORAY read the ſame day a relation of the *making of ceruſs*, from from Mr. VERNATTI^f; upon which a committee conſiſting of Dr. GODDARD, Dr. PETTY, Dr. MERRET, Dr. WHISTLER, the lord viscount BROUNCKER, and Mr. AUSTEN, were appointed to examine the method of making of ceruſs.

March 18. A diſcourſe being held concerning the water's aſcending in tubes or ſyphons, Dr. HENSHAW made ſeveral experiments in one tube with water, ſpirit of wine, roſe-water, ſpirit of ſalt, and ſpirit of vitriol.

Sir PAUL NEILE brought in ſome ſolid glaſs balls.

^c Register-book, vol. i. p. 15. It is printed in the Philoſophical Tranſactions, vol. xi. n^o 137. p. 925, for Jan. and Feb. 1674.

^d Register-book, vol. i. p. 36.

^e Hiſt. of the Royal Society, p. 200.

^f Register-book, vol. i. p. 19. It is printed in the Philoſophical Tranſactions, vol. xi. n^o 137. p. 935.

The experiment of the king's bubbles was deferred till Mr. LEWIN could get a pot of metal in a hotter fire than that in the Minorities.

Mr. BOYLE was requested to remember his experiment of the air.

March 20. It was resolved, that the number of the members of the society be enlarged:

And that the professors of Gresham College, who were members, be overseers for fitting up the room for the society's meeting there.

The amanuensis was ordered to make the experiment of the calcination of antimony, whether it increaseth or not; and to weigh it before and after, in and out of the water.

Dr. WILLIAM QUATREMAINE, and Mr. JOHN VAUGHAN, were elected members; and Dr. WALTER CHARLTON ordered to be the first put to the scrutiny at the next meeting; who however was not admitted of the society till the 15th of May following.

Dr. PETTY was desired to communicate his relation of clothing, before he went to Ireland.

March 25. Dr. HENSHAW was desired to inquire of his brother concerning the boat, which would not sink.

It was directed likewise, that inquiry should be made, whether there be such little dwarfish men in the vaults of the Canaries, as was reported; and concerning the paper relating to the Canaries.

Mr. BOYLE was requested to report the name of the place in Brasil, where that wood is, which attracts fishes; and of the fish, which turns to the wind, when suspended by a thread.

Dr. MERRET was to be asked for the catalogue of trades, which he took, of Mr. EVELYN's and Dr. PETTY's.

March 27. It was ordered to inquire, whether the flakes of snow are bigger or less in Teneriffe than in England: and whether the gross fume of oil of tartar mixed with aqua fortis will ascend as much, more or less, above than below the mountain Teneriffe.

Adders were directed to be provided to try the experiment of the stone.

Dr. GODDARD proposed a method of measuring the compression of the air.

Mr. BOYLE was desired to hasten his intended alteration of his air-pump.

The amanuensis was ordered to calcine antimony, according to the description in Monsieur LA FEBURE's book.

April 1. It was ordered, that care be taken for the calcination of antimony at the height of the sun:

That the amanuensis provide a crooked tube for trying the experiment of water piercing quicksilver, or repelling it by its weight:

That two engines be made, one like the glass one, and the other agreeable to the form of that of Mr. ROOKE; and if the stock of the society would not furnish the expence, the members should contribute to the defraying it; and the committee appointed for the care of this business were Mr. BOYLE, Dr. GODDARD, and Mr. ROOKE.

CORNELIUS VERMUYDEN, esq; was proposed as a candidate.

April 3. Mr. BOYLE, Dr. MERRET, and Mr. COLWALL, were desired to draw up an account of the manner of making vitriol; and Dr. PETTY to inquire in Ireland concerning the petrification of wood, the bernacles, the variation of the compass, the trial of the quicksilver experiment, and the ebbing and flowing of a brook.

Mr. BOYLE was requested to consider, at his leisure, of GLAUBER's method of discovering minerals.

He delivered to the society his book concerning glass-tubes; upon which it was ordered, that every member should have one of these books, in order to discourse upon it at the meeting on that day se'nnight.

It was resolved, that at the next meeting it should be considered, whether the matters to be debated at any meeting should be agreed upon at the preceding one..

An inquiry was again ordered to be made, concerning the fifth mentioned by SCHOTTUS, as turning to the wind, when suspended by a thread.

April 7. The lord viscount Brouncker made his experiments of the recoiling: of guns; which succeeded according to expectation.

The society did not sit this day:

April 10. The lord viscount Brouncker was desired to give in writing an account of his experiments of the recoiling of guns.

His lordship was likewise appointed of a committee with Sir ROBERT MORAY, Sir PAUL NEILE, Dr. WALLIS Dr. GODDARD, and Mr. WREN, to consider all sorts of tools and instruments for making glasses proper for perpectives, for the use of the society; and to meet together on Fridays for that purpose.

Sir.

Sir ROBERT MORAY was chosen president for another month.

The following resolutions were agreed to :

That the amanuensis inform himself of the habitation of every particular member, in order to summon them to the meetings of the society, whenever matters of importance were to be debated :

That the society meet no more than once a week ; and that the meeting be on Wednesday :

That the society be adjourned till that day three weeks :

That every member pay his contribution and arrears every Wednesday :

That the subject of the debate of every subsequent meeting be agreed upon at the preceding :

That the subject of the next debate be Mr. ROBERT HOOKE's tract, printed in 1660, concerning the cause of the rising of water in slender glass-pipes higher than in larger, and that in a certain proportion to their bores¹.

The amanuensis was ordered to make several crooked glasses with bubbles at the end.

May 1. It was ordered, that the treasurer, or his deputy, be desired to call every day on the members for their arrears :

That the amanuensis provide an engine for diving as soon as possible, and a cylindrical glass, with water and small empty bubbles in it ; and that he draw up a list of all the orders not yet executed :

That the subject debated this day, pursuant to the order of the last meeting, be resumed at the next.

May 8. It was proposed, that the society write to Mr. WREN, and charge him, in the king's name, to make a globe of the moon² ; and likewise to continue the description of several insects, as he had begun.

Mr.

¹ See Mr. WALLER's Life of Dr. HOOKE, p. viii.

² The king's command to Mr. WREN to prosecute and perfect this lunar globe was signified to him by a letter under the joint hands of Sir ROBERT MORAY and Sir PAUL NEILE, dated from Whitehall, the 17th of May, 1661. This globe represented not only the spots and various degrees of whiteness upon the surface of the moon, but the hills, eminences, and cavities of

it moulded in solid work. On the pedestal was engraved this inscription, and underneath a scale of miles :

CAROLO SECUNDO
M. BR. FR. ET HIB. R.
CVIIVS AMPLITVDINI QVIA VNVS NON
SVFFICI
NOVVMHIVNC ORBEM SELENOSPHAERIO
EXPRESSVM
D. D. D.
CHR. WREN.
His.

Mr. ROOKE was desired to give in writing his observations of the island of St. Helena.

A letter having been read from prince LEOPOLD, brother of the grand duke of Tuscany, to the society, a committee, consisting of the lord viscount Brouncker, Mr. Boyle, Sir KENELME DIGBY, Sir ROBERT MORAY, Dr. ENT, the president for the time being, and Mr. CROUNE, was appointed to correspond constantly with that prince; three of them at least to be *a quorum*; to meet on the Monday following at the lord viscount Brouncker's lodgings, and to draw up an answer as soon as possible to the prince's letter.

Mr. COLWALL read an account of the making of green copperas, and produced a basket of the copperas stones.

After reading this account, Sir ROBERT MORAY was desired to write to the jesuits of Liege, about their manner of making copperas there.

It was ordered, that Mr. COLWALL's account be registered¹; and that the society have copies of it, in order to form questions upon it.

It was observed upon this occasion, that Chemnitz in Hungary produced the best vitriol.

Dr. WILKINS having moved as a subject worthy of consideration the generation of several insects,

Sir ROBERT MORAY was desired to use his best endeavours to procure the history of insects;

Dr. CLARKE to bring under Mr. PELLIN's hand the relation of the production of young vipers from the powder of the liver and lungs of vipers; as Sir KENELME DIGBY promised one under the hand of a nobleman;

Dr. CLARKE and Mr. BOYLE, to procure an history of vipers.

Dr. GODDARD to suspend over a warm balneum a glass nipt up with salt of tartar in it.

Mr. BOYLE, Dr. GODDARD, and Dr. PETTY, to consult concerning the nature of gravity.

Mr. CROUNE to write to Dr. POWER, and to procure a correspondency between Sir WILLIAM PERSALL, Mr. BALLE, and Dr. POWER, who was proposed as a candidate, as was likewise Mr. JOHN ALEYN.

His majesty received this globe with peculiar satisfaction, and ordered it to be placed among the curiosities of his cabinet. This globe came afterwards into the possession of Mr. WREN's son,

CHRISTOPHER WREN, esq. Dr. WARD's Lives of the professors of Gresham College, p. 100. n. (a).
¹ Register-book, vol. i. p. 21. It is printed in the Philos. Transf. vol. xi. n^o 142. p. 1056.

Mr. BOYLE and Mr. EVELYN were appointed curators for the observing of infects.

A motion was made for the erecting of a library for the use of the society.

May 15. Sir ROBERT MORAY having had occasion to acquaint the king with prince LEOPOLD's letter to the society, had his majesty's consent to return an answer to it.

It was resolved, that Sir PAUL NEILE be desired to continue his employment of the artificer for making glasses for perspectives:

And that Dr. GODDARD do undertake the trying the weight of bodies in water and air.

A book having been presented to the society by Col. TUKE from an academy at Paris^a, the committee for foreign correspondence was directed to return a speedy answer to that academy, with the thanks of the society; and Col. TUKE was added to that committee.

Mr. BOYLE presented the society with his engine.

Dr. BAYNES, Dr. FINCH, the lord viscount Brouncker, Mr. BOYLE, Dr. WILKINS, Dr. WARD, Dr. WALLIS, Dr. MERRET, Mr. OLDENBURG, Mr. EVELYN, Mr. WALLER, and Mr. HENSHAW, were nominated a committee for erecting a library, and examining the generation of infects.

Dr. CHARLTON and Mr. ALEYN were admitted into the society; and Sir GILBERT TALBOT and Mr. WALTER POPE, who had been lately chosen professor of astronomy in Gresham College, on the resignation of Mr. WREN, were proposed as candidates.

ROBERT CARL of SUNDERLAND, and Col. TUKE, subscribed their names as members.

It was resolved, to state the number of the society at the next meeting:

That from henceforth every member, as soon as he shall be admitted, shall pay, besides twenty shillings advancement, his weekly contribution from the time of his admission.

The subjects of the debate of the next meeting were appointed to be concerning the little tubes, and the Florentine experiment.

^a This academy began their meeting on the 18th of December 1657, at the house of Monsieur de MONTMOR, according to the account of Monsieur GRAVEOL in his *Mémoires pour la vie de Monsieur de Sorbiere*, prefixed to the *Sorbiereana*. Monsieur de SORBIERE himself in a letter to Mr. HOBBS, dated at Paris, Feb. 1, 1658, and printed

in his *Lettres & discours sur diverses matieres curieuses*, p. 631, edit. Paris 1660, mentions the regulations of that assembly; and some of his discourses read there in the years 1658 and 1659, are published in that work, p. 181, 190, 193, 691, and 701.

May

May 22. Col. TUKE was desired to bring in writing a short account of what he had related to the society concerning the academy at Paris; and a return of thanks was ordered to be made to Monsieur de MONTMOR¹, master of the requests to the French king, and to Monsieur de SORBIERE, both members of that academy.

It was ordered, that the committee of correspondence should meet again the next day, at the lord viscount Brouncker's chamber, or elsewhere, as they should agree.

A discourse was held concerning poison; on which occasion it was observed, that one grain and a half of nux vomica will kill a large bird.

The ligature of vipers from the tail to the head was directed to be tried.

Dr. FINCH and Dr. BAYNES were desired, upon their arrival in Italy², to inquire after poisons; and Mr. POVEY to send to Bantam about the examination of that poison, which is related to be so quick, as to turn a man's blood suddenly into jelly.

Dr. FINCH was requested to draw up a letter to be sent to prince LEOPOLD.

The committee for the examination of insects was appointed to meet on the Monday following, at six of the clock, at Mr. BOYLE's lodgings.

The generation of insects was discoursed of, and the lord HATTON was desired to write about Mr. MORIN's book of insects, and to purchase it, if possible; and the earl of NORTHAMPTON to make the like inquiry about Mr. MARSHAL's treatise on the same subject.

DUDLEY PALMER, esq; was proposed as a candidate.

It was resolved, that Wednesday the 26th of June be a solemn meeting of the society; and that every member be summoned, to consult about elections.

The next meeting day to be the Tuesday following.

Sir KENELME DIGBY was desired to bring in at the next meeting his papers and the stones ment oned by him this day.

The Florentine experiment was ordered to be continued.

Mr. BOYLE was desired to repeat his experiment at the next meeting.

The business of the history of trades was appointed to be discoursed of at the next meeting.

¹ HENRY LEWIS HABERT, Seigneur de Montmor. He died at Paris the 21st of January, 1679, N. S.

² They had both a design of going again to Italy, whence they had returned upon the resolu-

tion; but they did not perform this second journey to that country till 1665. See Dr. WARD's Lives of the professors of Gresham College, p. 228, 229.

The

The amanuensis was ordered to go the next day to Rosemary-lane, to bespeak two or three hundred more of the solid glass balls.

Sir GILBERT TALBOT and Mr. POPE were admitted of the society.

May 28. Sir KENELME DIGBY brought in and read his relation of plants and animals, and was desired to publish it, and to leave the original in the society's custody.

It was resolved, that every member, who hath published or shall publish any work, give the society one copy.

Dr. WILKINS, Dr. ENT, Dr. WHISTLER, Dr. WARD, Dr. HENSHAW, and Mr. ROOKE were appointed a committee for matters of fact concerning the rising of liquors in small pipes.

Dr. CLARKE was desired to communicate the experiments of injections into veins.

Mr. DUDLEY PALMER was admitted of the society.

June 5. Sir KENELME DIGBY brought in the stones mentioned by him at the meeting of the 22d of May, and called by him *oculus mundi*.

Col. TUKE related the manner of the rain like corn near Norwich.

Mr. BOYLE and Mr. EVELYN were desired to sow some of these rained seeds, and to try their product; and col. TUKE to bring in more of these seeds, and to inquire exactly into the history of them.

Dr. CHARLTON was requested to entreat the lord HATTON to inquire for Mr. MORIN's book of insects.

Mr. BOYLE related, that a gentleman having made some experiments on the air, tried that of the quicksilver at the top and bottom of an hill, where there was found the difference of three inches.

Magnetical cures being then discoursed of, Sir GILBERT TALBOT promised to communicate what he knew of sympathetical cures; and those members, who had any of the powder of sympathy, were desired to bring some of it at the next meeting.

Dr. CHARLTON promised to deliver in some of that white powder by the Bath, which put into water heats it.

Dr. CLARKE was requested to give in the narrative of his injection of liquors into the veins.

VOL. I.

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He

He moved, that it might be tried in Mr. BOYLE's engine, whether filtration would succeed in it, or not.

A discourse was held concerning the extinguishing of a lighted candle in a vessel like a funnel or blind-head.

The duke of BUCKINGHAM, who was admitted of the society this day, was requested to order charcoal to be distilled by his chemist.

It was observed, that the two cats bitten by the vipers on the 15th of May, did not die, but recovered the next day.

The duke of BUCKINGHAM promised to bring to the society a piece of an unicorn's horn.

Sir KENELME DIGBY related, that the calcinated powder of toads reverberated, being applied in bags upon the stomach of a pestiferate body, cures it by several applications.

Dr. CHARLTON was desired to bring in at the next meeting, some poison for trying the experiment upon little birds.

The letter to prince LEOPOLD, and that to the academy at Paris, were both referred to the committee of correspondence.

Sir JOHN PETTUS, and Mr. RICHARD WHITE, were proposed as candidates.

Col. TUKE having given in (probably this day, though there is no minute of it) his relation concerning the academy at Paris, it was registered on the 12th of June, and was in these terms*.

“ Mr. PRESIDENT,

“ Being very sensible of the great obligation, which I lately received from this learned assembly, by my admission into your society, I did excogitate the means, which might best express my just esteem for your persons, my zeal for the advancement of your worthy designs, and my gratitude for the unmerited favour, which you have been pleased to confer upon me.

“ And conceiving, that there is nothing, which does more increase the force of the commonwealth of letters than a correspondence with the learned men of other nations, and all little enough to withstand the rude assaults of the ignorant multitudes, who wanting the virtuous industry to improve their natural light, do endeavour (by decrying all acquired knowledge in others) to make their own lazy ignorance pass for judgment: from this reflection I did presume, that it might be an agreeable service to this illustrious assembly, to inform my-

* Register-book, vol. i. p. 25.

“ self

“ self, when I was lately in Paris, what friends we had in that flourishing city :
 “ and to this end I sought out an old acquaintance of mine, one Monsieur de
 “ ROBERVAL, a learned and judicious gentleman, who possessed the chair of the
 “ king’s professor of the mathematics in Paris, from whom I received this account:

“ That there were several assemblies of learned men in Paris, of which the most
 “ considerable was the French academy, formerly instituted by cardinal de RICHELIEU,
 “ and since protected by Monsieur de SEQUIER, chancellor of France, at
 “ whose house they did use to meet, but were now very much declined by the barrenness
 “ of the subject of their entertainment, which was only the embellishing of
 “ their style and polishing of verse ; but especially by a new institution of an assembly
 “ of learned men, whose business is to advance the knowledge of nature by
 “ conferences and experiments ; into which society many, that were formerly of the
 “ French academy, are now entered.

“ Finding by Monsieur de ROBERVAL’s discourse, that the entertainment of this
 “ society had a near resemblance to the design of those, who assemble here, some
 “ few days before I left Paris, I went along with Monsieur le COMTE D’ALBONNE,
 “ a person of eminent quality, and a great lover of learning, to Monsieur de
 “ MONTMOR’s house, the patron and president of this society, where they assemble
 “ every Tuesday in the afternoon ; who received us very civilly. And he being
 “ informed by Monsieur le COMTE D’ALBONNE, that I had the honour to have a
 “ place in this assembly, after he had shewed me his pictures and his medals, and
 “ his garden of flowers, in all which he is very curious, he brought me into the
 “ hall, where those of the society do assemble.

“ There I found near twenty persons, sitting in a semicircle about a table ; at
 “ which the president himself sat, and did me the honour to place me by him.

“ As soon as we were seated, Monsieur de SORBIERE, secretary to the assembly,
 “ addressing to the president, told him, that Monsieur QUILLET, who should that
 “ day have entertained them with a discourse of comets, had sent to let him know,
 “ that he was indisposed, and desired their excuse. So they fell upon the discourse
 “ of an experiment, which they had lately made. Which being ended, Monsieur
 “ de MONTMOR, the president, informed the society, that I had the honour to be
 “ of your number ; and desired me, that I would report to them the subject of your
 “ conferences, and the forms of your institutions ; which I did as well as I was able.

“ After they had had the patience to hear so unpolished a relation, the president,
 “ Monsieur de MONTMOR, replied, that he was overjoyed to hear of the
 “ growth of so noble a design, of whose birth they had been advertised by letters
 “ from Monsieur OLDENBURG. And he said, they did not doubt but that the
 “ success would answer the expectations of all the lovers of learning ; being convinced
 “ by many modern pieces, that had been written by our countrymen, that
 “ the genius of our nation was very well fitted for the advancement of all sorts of
 “ learning. And then he mentioned GILBERT, BACON, HARVEY, HOBBS,
 “ DIGBY, GLISSON, CHARLTON and divers others, whose names do not occur to

“ my memory. Then he deplored the unhappy condition of the nobility and gentry of their nation, who not being able to furnish the profusion of their expences from their patrimonies, were forced, as soon as they were capable of business, to pursue their fortunes either in the court, armies, or governments in the provinces, that they had not the leisure to cultivate their minds by letters. This occasioned a gross ignorance amongst the persons of quality, and consequently a disregard to all sorts of sciences.

“ I told them, that the noblemen and gentlemen of our country, having plentiful revenues in land, and their expences being proportioned to their estates, they had both time and means to acquire knowledge : and that we were so happy as to be governed by a king, who, amongst other illustrious qualities, was a great favourer of learning : and that we promised ourselves from the prudence of his government so much peace and plenty, as we did not doubt to see the arts and sciences flourish in our country. This confirmed their belief, which was expressed by many eulogies, both of his majesty and our nation, by divers of the assembly ; and they concluded with their earnest desires of a correspondence with us, as the best means to increase our common light, to render our lives more pleasant by our mutual commerce, and to strengthen the republic of learning.

“ I assured them, that as soon as I arrived, I would not fail to communicate their design to our society ; who were not such strangers to the reputation of their illustrious assembly, as not to embrace this overture of commerce with great respect and satisfaction.

“ Then Monsieur le COMTE D'ALBONNE acquainted them with a relation, which I made to him of Mr. BOYLE's engine, and of divers experiments concerning the extension of air ; with which they seemed very much delighted, and desired me to send them Mr. BOYLE's book upon this subject ; with this promise, that if they made any discoveries worthy of our knowledge, they would freely impart them to us.

“ The next day the president, Monsieur de MONTMOR, came to my lodging at Palais Royal, and carried me to one Monsieur de ROHAULT's house, who is of their society, from whom I heard a very ingenious lecture of the nature of the load-stone, and his hypothesis made out by divers curious experiments.

“ The day following Monsieur de SORBIERE, secretary to their society, did me the honour to visit me, who told me, that he was commanded by the president and the rest of the society to make me a compliment, and to remind me of my promise of endeavouring to establish a commerce between them and this honourable society ; and then he presented me with that book, which I produced at my first appearance in this learned circle.

“ This is a summary account of the relation, which I lately made in this place more at large.”

June 13. Dr. CHARLTON gave three grains of nux vomica to a young thrush, and as much to a young woodpecker, who had convulsions about three hours before they died. He gave also to another young thrush two grains of nux vomica and as much sublimate mixed together; and that killed the bird in nine minutes time.

Col. TUKE brought in the history of the rained seeds and some ivy-berries, the kernels of which were the same, that were reported to have fallen down from the sky in Warwickshire, Shropshire, &c.

Dr. CHARLTON was desired to provide two male vipers against the next meeting, and to communicate his relation concerning poison:

Mr. WYLDE to shew the experiment of the stone kindled by wetting:

Dr. HENSHAW to procure the like experiment, and also the history of mechanics:

Sir WILLIAM PERSALL to make his vitriol experiment:

Dr. SCARBURGH to bring in his relation of echos:

Mr. ROOKE that of the satellites of Jupiter, and the height of the atmosphere:

Dr. WILKINS the filtrations: And

Mr. POPE to procure the experiment of breaking pebbles with the hand.

It was ordered, that the experiment of the cupping-glass and lighted candle be made at the next meeting:

That the diving engine be prepared with the utmost expedition:

That the sympathetic powder be brought in at the next meeting:

That the orders of every preceding meeting be read at the subsequent one.

Dr. CHARLTON presented the society with his book entitled, *Exercitationes pathologicae, in quibus morborum pene omnium natura, generatio, & causa, ex novis anatomiconum inventis sedulo inquiruntur*.*

Mr. OLDENBURG brought in an account of Monsieur MORIN's treatise on insects.

June 14. There were entered into the Register-book[†], *Propositions of some experiments to be made by the earl of SANDWICH in his present voyage*[‡]:

* Printed at London 1661, in 4to. † Vol. i. p. 29. ‡ to Lisbon, in order to bring over the Infanta of Portugal, who was to be married to king CHARLES II.

1. " To sound the depth of the sea in the bay of Biscay and the Straits, at full sea, or low water, without a line, thus :

" Take a globe of some swimming wood, having a hook fastened to it. Then take a lead sufficient to sink it, shaped like the figure of 7 ; and put the upper part of it into the hook, and as you let it fall into the sea, take notice of the time by a second watch, and observe how long the globe is submersed in the water ; for by that the depth is to be computed. So soon as the lower end of the lead touches the ground, it slips out of the hook, and up comes the globe. The rule of computing the depth of the water by the time of the globe's submersion, is to be made by trying it in a depth of 60, 80, or 100 fathoms : so is another time to another number of fathoms.

2. " To sink an empty globe of tin with an addition of lead, fastened to a line, as many hundred fathoms deep as may be, to see what will become of it.

3. " In some place of the sea of two or three hundred fathoms deep, or more, draw up some of the water near the bottom, to compare the saltness of it with that next the surface. It is to be done thus, or some other such way :

" Take a cylindrical vessel, and fit a sucker to it, with a shaft or hook to hold a string or small line fastened to it. Put the sucker or stopper down to the bottom of the vessel, which is to have a small hole at the bottom. Then sink and let down the vessel by a long cord into the water, together with a line as long as is fastened at the stopper ; and let down so dextrously, as it pluck not up the stopper, till the vessel be at the depth proposed ; then pluck out the stopper, and the vessel will bring up the water from the depth that is desired.

4. " To take up a glass full of salt-water on the English shore, and weigh it ; then evaporate the water, and see what salt it holds ; and thus do often ; that is at every three or four degrees, as you go southward.

5. " Inquire after a true account of the ebbing and flowing between the Straits ; and whether the tide flow always eastward at the shores, and at the middle ; and how it varies, if it be not constant. And if you have the opportunity, try whether in the middle of the Straits the surface of the water flow eastward, whilst the lower part of it runs westward.

" This is to be done by letting a bucket down 60, 80, or 100 fathoms, and tied to a boat ; and then, if there be contrary motions in the water, the boat will stay as at anchor, or move accordingly.

6. " Take sea-water in a fit vessel into a dark place, and shake and agitate it so as it may break into drops, to see whether it will sparkle and shine, as when it is in the sea, broken by the wind or otherwise in the night."

June 19. A loadstone was produced weighing 2 lb. 2 oz. and an anchor of 11 lb. 10 oz. Dr.

Dr. CHARLTON read his paper on poisons.

It was ordered, that two puppies be provided against the next meeting, for the trial of experiments of poisons.

Mr. POVEY was desired to deliver in an account of brass.

Sir GILBERT TALBOT's experiments of the sympathetic powder were ordered to be registered.

Sir ROBERT MORAY and Mr. HAMMOND produced their sympathetic powders.

Mr. EVELYN was desired to bring in to the next meeting that powder of sympathy, which he had of Sir GILBERT TALBOT's making :

And Mr. POPE to continue his experiment of breaking pebbles with the hand.

Mr. BOYLE's experiment of the flat marble was ordered to be tried at the next meeting :

And that of the poisonous arrow, produced by Mr. VERMUYDEN, to be tried on the same day.

June 26. The experiment of the cupping-glass and light was made, and succeeded according to expectation.

A dog was bit in the left foot by a viper, and swelled for three or four hours ; but recovered.

Another dog was wounded with a poisonous arrow ; but no harm appeared to arise from it.

Dr. ENT, Dr. CLARKE, Dr. GODDARD, and Dr. WHISTLER, were appointed curators of the proposal made by Sir GILBERT TALBOT, of tormenting a man with the sympathetic powder.

Dr. GODDARD, Dr. WILKINS, and Mr. ROOKE, were desired to curators be of the experiment of compressing of water at the next meeting.

Mr. ROOKE was requested to speak to Mr. PELLIN, to procure two pots of powder of vipers, the one of whole vipers, and the other of only the hearts and livers of vipers : And Mr. HENSHAW to bring in the experiment of salt-petre, and gun-powder.

It was ordered, that the operator should make the experiment of the solar calcination of antimony, to see whether it increased in weight.

Mr. BOYLE brought in three cylinders of glass sealed up, and full of water, with empty bubbles nipt up; some of which ascended, the water being heated, and others descended by the like heating; and others ascended, the water being cooled in cold water, and descended by heating the water.

SIR JOHN PETTUS and Mr. RICHARD WHITE were elected into the society.

PHILIP PACKER, esq; THOMAS STANLEY, esq; SIR THOMAS NOTTE, kn. and WILLIAM AERSKINE, esq; were proposed as candidates.

Dr. QUATERMAINE subscribed his name.

Col. TUKE brought in writing the following *Brief account of the supposed rain of wheat*, which was registered^{*}.

“ On the the 30th of May, 1661. Mr. HENRY PUCKERING, son to Sir HENRY PUCKERING of Warwick, brought some papers of seeds, resembling wheat, to the king, with a letter written by Mr. WILLIAM HALYBURTON, dated the 27th May, from Warwick, out of which letter I have made this extract.

“ *Instead of news I send you some papers of wonders: On Saturday last it was rumoured in this town, that it rained wheat at Tuckbrooke, a village about two miles from Warwick. Whereupon some of the inhabitants of this town went thither, where they saw great quantities on the way, in the fields, and on the leads of the church, castle, and priory, and upon the hearths of the chimneys in the chambers. And ARTHUR MASON, coming out of Shropshire, reports, that it hath rained the like in many places of that county. God make us thankful for this miraculous blessing, &c.*

“ I brought some papers of these seeds, with this letter, to the society at Gresham College, who would not enter into any consideration of it, till they were better informed of the matter of fact. Hereupon, I entreated Mr. HENRY PUCKERING to write to the bailiff of the town of Warwick, to the ministers and physicians, to send us an account of the matter of fact, and their opinions of it. In the bailiff's letter, dated the 3d of June, I find this report verified, affirming, that himself, with the inhabitants of the town, were in a great astonishment at this wonder. But before the next day of our meeting, I sent for some ivy-berries, and brought them to Gresham College, with some of these seeds resembling wheat; and taking off the outward pu'p of the ivy-berries, we found in each of the berries four seeds; which were generally concluded by the society to be the same with those, that were supposed and believed by the common people to have been wheat, that had been rained; and that they were

^{*} Register-book, vol. i. p. 49.

brought

"brought to those places where they were found by starlings, who, of all the birds that we know, do assemble in the greatest numbers, and do, at this time of the year, feed upon these berries; and digesting the outward pulp, they render these seeds by casting, as hawks do feathers and bones."

July 3. Mr. POWLE offered to the society to employ himself in the country about any thing, which they shou'd direct him to.

He was desired to speak with Mr. WREN about the lunar globe, and the pictures of small insects by the microscope:

Mr. CROUNE to procure, against the next meeting, some fresh vipers; and the operator to provide fresh hazle-sticks.

Mr. EVELYN presented his relation of gravings and etching; and, after public thanks returned to him, was requested to transcribe it.

The experiment of compression of water was made by Dr. GODDARD, the account of which he brought in, and was desired to proceed farther in it.

Dr. WILKINS and Dr. GODDARD were desired to provide a glass fountain globe with a syringe from Greatericks.

It was ordered, that the amanuensis nip up bubbles till they almost sink, and try whether they will sink by compression of water in a glass-tube:

And that the experiment of two flat marbles be made at the next meeting.

Dr. WILKINS produced a letter from Mr. WREN.

July 10. Mr. CROUNE produced the vipers, and the operator the fresh hazle-sticks, both ordered at the last meeting; with which the experiment was tried, but failed.

Mr. CROUNE and Mr. VERMUYDEN undertook to try the experiment of tormenting with the sympathetic powder; and the amanuensis was ordered to try the like with common vitriol.

A fountain-bottle was directed to be provided, without a pipe to the bottom, as also a syringe.

An account of the lord viscount Brouncker's *experiments of the recoiling of guns* was read by Mr. ROOKE, and presented to the society. Upon which, public thanks were returned to his lordship, and he was desired to prosecute his experiments; and the account of them was ordered to be registered; which was accordingly done; and it was afterwards published by Dr. SPRAT.

¹ Register book, vol. i. p. 143.

² Hist. of the Roy. Soc. p. 233.

The amasuenfis produced the nipped bubbles, according to order; and trial being made, they did not sink by compression of the water.

Mr. ROOKE read his paper of observations of the eclipses of the satellites of Jupiter; for which thanks were returned to him, and he was requested to publish it. It was entered into the register-book*, and printed by Dr. SPRAT†.

Mr. BOYLE made his experiment of two flat marbles, and forty-two pounds was taken up by them.

ANDREW ELLISE, esq; was proposed as a candidate.

July 17. Sir PAUL NEILE having mentioned, that the king had, within four days past, desired to have a reason assigned, why the sensitive plants stir and contract themselves upon being touched; it was resolved, that Dr. WILKINS, Dr. CLARKE, Mr. BOYLE, Mr. EVELYN, and Dr. GODDARD, be curators for examining the fact relating to those plants.

It was ordered, that glass-drops be made in aqua fortis and in oil of terebinthine: and that on the Friday following the diving engine should be tried at Deptford.

Mr. CROUNE was desired to keep the slow-worm, in order to see, whether the young one would eat through its belly.

In the interval between this and the subsequent meeting, Sir ROBERT MORAY, the president of the society, wrote the following letter‡, dated the 22d of July, 1661, and addressed to Monsieur de MONTMOR, president of the academy at Paris.

“ AMPLISSIME VIR,

“ Cum ante dies aliquot ornatissimus vir, TUKIUS noster, nobis narraret, quam esset in illustri conventu vestro honorificè humaniterque exceptus, sic affecit
“ ea res societatem nostram, ut quanquam id eximie illius virtuti merito tributum
“ fuisse credimus, tamen non difficile fuerit præclaram quoque erga nos voluntatem vestram inde manifesto perspicere. Præsertim verò cum porrò adjiceret,
“ quam propenso affectu ipsum de ratione institutisque societatis nostræ differenter
“ tem audiveritis. Nempe aiebat serè lætari vos, cœpta esse ab hominibus nostris in pretio haberi ea studia, quæ naturæ contemplationem, per aliquot retrò
“ sæcula turpiter neglectam jacentemque, erigant, & ad vitæ communis usum traducant. Quin cupere etiam vehementer societatem vestram (cui illa jam pridem placueret) ut ea inter nos intercedant commercia, quæ optimam hanc studiorum necessitudinem in posterum foveant. Quæ sane exquisitæ humanitatis officia nobis à clarissimis viris ultro delata summi honoris loco amplectimur.
“ Enimverò & nobis in hoc studio currentibus ab exemplo vestro ea car ultri adii

* Vol. ii. p. 25.

† Hist. of Roy. Soc. p. 183.

‡ Letter-book, vol. i. p. 1.

libenter fatemur; ut adeo Gallia vestra, si non omnem faniorem philosophiam à fundamentis constituisse, certe tamen illam nuperis annis exornasse plurimum atque ampliassse dicenda sit. Non jam necesse est magna illa nomina, Cartesium atque Gassendum, in hujus rei fidem producamus, qui peculiari quodam genio ad eam tractandam accessisse videntur: quorum philosophandi rationem non quidem è majorum commentariis, sterilibus plerumque & infructuosis, exscriptam, sed è rebus ipsis erutam, magni, ut par est, aestimamus. Sicubi autem viris maximis aut hæere aliquando, aut etiam, ut fit, cespitare contigerit, dandum id profecto humanitati, cui nunquam in hac obscurâ rerum caligine inoffenso semper pede progredi licebit. Nobis idcirco, qui partem aliquam longinqui hujus itineris conficere speramus, certum est imprimis necessarium experimentorum commeatum instruere; quæ & lucem errantibus accendant, & offensoles continuo sublevent, & viæ molestias diluant. Namque, ut quod res est dicamus, id unum hæcenus philosophiæ defuisse videtur, quod non satis se exercuerint homines in historiâ naturæ rite adornandâ conquærendique bonæ fidei experimentis, quibus, ceu firmissimæ substructioni, tota futuri operis moles innitatur. Illudne verò insuper addemus? paulatim jam desciscere videri philosophantes à præstantissimâ illâ magni Galilæi methodo, qui ita cum philosophiâ geometriam conjunxit, ut merito dicatur veteris sapientiæ normam temporibus nostris primus restituisse; quæ neminem *ἀγνοῦντες* sacris suis initiari voluit. Arduum omnino (inquies) opus, ipsaque vastitate pertimiscendum! Ita profecto est, clarissime MONTMORI, quodque omnium sæculorum industriam facile exhauriat. Quamobrem nos quoque eo fidentius adjutrices vestras manus exposcimus, parati invicem, si quâ in re opera nostra vobis usui esse queat, nostrum qualemcunque apparatus in vestram gratiam expromere. Pergite interim philosophari, viri spectatissimi, tuque præsertim, amplissime MONTMORI; dumque philosophiam ac musas hospitio excipis, ædes tuas, ceu honori virtutis dicatum templum, grata equidem posteritas veneretur. Quod libens vovet

Amplitudinis vestræ studiosissimus,

Londini, 22 Jolii,
1661.

Societatis ad tempus præses,

R. MORAY."

July 24. A report was made of the trial of the diving engine at Deptford on Friday preceding, by the amanuensis, who stayed in it eight and twenty minutes under water.

A circle was made with powder of unicorn's horn, and a spider set in the middle of it, but it immediately ran out.

The trial being repeated several times, the spider once made some stay on the powder.

Dr. GODDARD was desired to provide for the experiment of the compression of air in the immersion in water.

F 2

July

July 31. Dr. WILKINS made his experiments of blown bladders, 'which being continued by him at the next meeting, he brought the following account of them in writing on the 14th of August, which was registered *:

Experiments concerning the force of blowing with a man's breath.

" Take the bladder of an ox or cow; fasten to the neck of it a pipe of about a quarter of an inch bore, and six or eight inches long: let one end of the pipe be trumpet-fashion, for the more convenient applying of the lip to it. If the whole body of this bladder, to that very end where it is fastened to the pipe, be laid flat upon a table (all the air being first thrust out) then a joint-stool, turned upside down, being set upon the bladder, and a fat boy of about sixteen or seventeen years old sitting on the other end of the joint-stool, a man may, by blowing this bladder, lift up the stool and boy about two inches. Let a string be fastened to the lower end of this bladder, the other end of it being tied by a chair or stool lying upon a table a little beyond the edge of the table: let the other end of this string, which hangs down, be fastened to a weight on the ground (suppose of fifty or an hundred pounds) let the string be tied betwixt the bottom of the bladder and the ring of the weight, that it may be partly tense and not lax; then if one blow into this bladder, as that doth extend and shorten, the weight will rise from the ground about three or four inches.

" If a square box be made, open at one end, with a hole at the bottom or other end, to put through the neck of the bladder and the pipe, each corner of this bottom having a leg of about two or three inches long, to keep it from the table; let the empty bladder be equally spread at the bottom of this box; then lay upon the bladder thus spread a square body, that may easily move within the hollow of the box. Upon this board set one hundred and ten pounds weight, or somewhat more. Then blowing at the pipe, this weight will ascend about five or six inches.

" Note, If the bore of the pipe be much less, like that at the small end of a tobacco-pipe, a man shall not be able to stir this weight: so that it should seem, that there is a certain proportion to be observed in the bore of the pipe, beyond or short of which, the blowing of the same man will not be of the same force.

" Quære, Whether this proportion be not answerable to that in the *aqua salientes*."

Mr. CROUNE produced a glass-jar, full of the powder of the bodies of vipers, and a gallipot full of the powder of only the hearts and livers of vipers.

Dr. WILKINS was desired to procure pipes of several bores to be made, for the experiment of blowing up weights:

* Register-book, vol. i. p. 57.

Sir ROBERT MORAY to bring some of the seeds of the sensitive plants : And

Dr. WHISTLER to communicate in writing his thoughts concerning gravitation and springs.

Mr. HENSHAW exhibited the spirals of nut-trees, shewing, that they grow snail-wife.

Aug. 7. Mr. PELLIN's letter, concerning the regeneration of vipers, was ordered to be filled up.

Mr. HENSHAW produced a stone called *Astroites* or *Lapis Stellaris*, of which the following account is registered ^b; That it moved with a little vinegar upon a declining plate several times repeated; and that it was observed, that the stone grew somewhat hot, and brake at the top. It is to be remarked, that there are two sorts of *Astroites*, the one marked with starry spots, and the other stellate in its form.

Mr. PALMER brought in a powder, reported to be that of a vegetable, which, thrown into the flame of a candle, burns and sparkles with a noise like that, which is made by loose corns of gun-powder. It is said to have been brought an hundred miles beyond Moscow, out of the mountains; and it is used by the people of that country chiefly for ulcers ^c.

Dr. WILKINS was desired to try salt-petre in water, to see if it increased in bulk : And

Sir JOHN FINCH to bring in a piece of an hat-band, made of *Lapis asbestos*.

It was ordered, that a trial be made of cooling wine with a wet cloth, with an hot iron, and with hot water : And

That copies be made of the account of glafs-drops.

Aug. 14. Sir ROBERT MORAY brought in glafs-drops, with cement about them; of which the following account is registered ^d:

“ They are made of green glafs, well refined.

“ Till the metal, as they call it, be well refined, they do not at all succeed, but crack and break soon after they are dropped into the water.

“ The best way of making them is, to take up some of the metal out of the pot, upon the end of an iron rod, and immediately let it drop into cold water, and there lie till it cool.

^b Register-book, vol. i. p. 56.

^c Ibid.

^d Ibid. p. 51.

“ If

“ If the metal be too hot when it drops into the water, the glafs-drop certainly frofts and cracks all over, and falls to pieces in the water.

“ Every one, that cracks not in the water, and lies in it till it be quite cold, is fure to be good.

“ The moft expert workmen know not the juft temper of heat, that is requifite, and therefore cannot promife before-hand to make one, that fhall prove good; and many of them mifcarry in the making, fometimes two, or three, or more, for one that hits.

“ Some of them froft, but the body falls not into pieces; others break in pieces before the red-heat be quite over, and with a fmall noife; others, foon after the red-heat is over, and with a great noife: fome neither break nor crack, till they feem to be quite cooled; others keep whole whilft they are in the water, and fly to pieces of themfelves, with a fmart noife, as foon as they are taken out of the water; fome an hour after, others keep whole fome days, or weeks, and then break without being touched.

“ If one of them be fnatched out of the water whilft it be red hot, the fmall part of the neck, and fo much of the thread or ftring it hangs by as has been in the water, will upon breaking fall into fmall parts; but not the body, though it have as large cavities in it as thofe that fly in pieces.

“ If one of them be cooled in the air hanging to the thread, or on the ground, it becomes like other glafs in all refpects, as folidity, &c.

“ When a glafs-drop falls into the water, it makes a little hissing noife, the body of it continuing red a pretty while; and there proceed from it many eruptions like fparkles, that crack and make it move and leap up; and many bubbles do rife from it in the water every where about it, till it cool: but if the water be ten or twelve inches deep, thefe bubbles diminish fo in the afcending, that they vanifh before they attain the furface of the water, where nothing is to be obferved but a little thin fteam.

“ The outside of the glafs-drop is clofe and fmoother like other glafs, but within it is fpongeous, and full of cavities or blebs.

“ The figure of it is roundifh at the bottom, for the moft part not unlike a pear-pearl; it terminates in a long neck, fo that never any of them are ftrait, and moft of them are crooked and bowed into fmall folds and wreaths, from the beginning of the neck till it end in a fmall point.

“ Almoft all thofe, that are made in water, have a little protuberance or knob a little above the largeft part of the body, and moft commonly placed on the fide, towards which the neck bends; though fometimes it be on that fide, which lies uppermoft in the veffel where it is made.

“ If

" If a glass-drop be let fall into water scalding hot, it will be sure to crack
" and break in the water, either before the red-heat be over, or soon after.

" In sallet oil they do not miscarry so frequently as in cold water.

" In oil they produce a greater number of bubbles, and larger ones, and the
" bubbling lasts longer than in water.

" Those, that are made in oil, have not so many nor so large blebs in them
" as those made in water ; and divers of them are smooth all over, and want those
" little knobs the others have.

" Some part of the neck of those, that are made in oil, and that part of the
" small thread, that is quenched in it, being cooled, breaks like common glass :
" but if the neck be broken near the body, and the body held close in one's hand,
" it will crack and break all over ; but flies not into so small parts, nor with so
" smart a force and noise as those made in water ; and the pieces will hold toge-
" ther till they be parted : and then there appears long streaks or rays upon them,
" pointing towards the center or middle of the body, and thwarting the little blebs
" or cavities of it ; whereof the number is not so great, nor the size so large, as in
" those made in water.

" If the glass-drops be dropped into vinegar, they frost and crack so as they are
" sure to fall to pieces before they be cold. The noise at falling in is more his-
" sing than in water, but the bubbles are not so remarkable.

" In milk they make no noise, nor any bubbles that can be perceived ; and
" never miss to frost and crack, and fall in pieces before they be cold.

" In spirit of wine they bubble more than in any of the other liquors ; and
" while they remain entire, tumble to and fro, and are more agitated than in other
" liquors, and never fail to crack and fall in pieces.

" By that time five or six are dropped into the spirit of wine, it will be set on
" flame ; but receives no particular taste by them.

" In water, wherein nitre or sal armoniac is dissolved, they succeed no better
" than in vinegar.

" In oil of terebinthine, one of them broke as in the spirit of wine ; but the
" second set it on fire, so as it could no more be used.

" In quicksilver, being forced to sink with a stick, it grew flattish and rough on
" the upper side : but the experiment could not be perfected, because it could not
" be kept under till it cooled.

" In an experiment made in a cylindrical glass like a beaker, filled with
" cold water, of seven or eight only one succeeded, the rest all cracking and
" breaking

“ breaking into pieces: only some of the company, taking the glafs in their
“ hand as soon as the drop was let fall into it, observed, that at the first falling in,
“ and for some time after, whilst the red-heat lasted, red sparks were shot forth
“ from the drop into the water; and that at the instant of the eruption of those
“ sparkles, and of the bubbles, which manifestly break out of it into the water, it
“ not only crackles, and sometimes with considerable noise, but the body moves
“ and leaps, as well of those that remain whole in the water, as those that break.

“ A blow with a small hammer, or other hard tool, will not break one of the
“ glafs-drops made in water, if it be touched no where but upon the body.

“ Break off the top of it, and it will all fly immediately into very minute parts
“ with a smart force and noise; and these parts will easily crumble into a coarse
“ dust.

“ If it be broken so as the sparks of it may have liberty to fly every way, they
“ will disperse themselves in an orb with violence like a little granado.

“ Some being rubbed upon a dry tile, fly into pieces by that time the bottom is
“ a little flatted: others not till half be rubbed off. One being rubbed till about
“ half was ground away, and then laid aside, did a little while after fly into pieces,
“ without being touched. Another rubbed almost to the very neck on a stone
“ with water and emeryl, did not fly at all.

“ If one of them be broken in one's hand under water, it strikes the hand more
“ smartly, and with more brisk noise than in the air: yet though it be held near
“ the surface, none of the small parts will fly out of it; but all fall down without
“ dispersing, as they do in the air.

“ One of them broken in Mr. Boyle's engine, when the receiver is well evacuated,
“ will fly in pieces as in the open air.

“ Anneal one of them in the fire, and it will become like ordinary glafs; only
“ the spring of it is so weakened, that it will not bend so much without breaking
“ as before.

“ A glafs-drop being fastened into cement, all but a part of the neck, and then
“ the tip of it broken off, it made a pretty smart noise, but not so great as those
“ use to do, that are broken in the hand: and though it clearly appears to be all
“ shivered within, and the colour turned greyish, the outside remained smooth
“ though cracked; and being taken in pieces, the parts of it rise in flakes, some-
“ what cracked in shape, and so cracked all over, that it easily crumbled into
“ dust.

“ One fastened in a ball of cement some half an inch in thickness, upon breaking
“ off the tip of it, it broke the ball in pieces like a granado.

“ Two

"Two or three of them being sent to a lapidary, to pierce them through as they do pearls, no sooner had the tool entered into them but they flew in pieces, as they used to do when the tip of them is broken off."

Mr. OLDENBURG exhibited a piece of camphire wood.

Dr. WILKINS brought in a glass-bottle fountain, for trying the compression of water.

Sir KENELME DIGBY presented the society with some copies of his *Discourse concerning the vegetation of plants*, spoken to the society on the 23d of January 1667, and now printed at London in 8vo.

He also produced a piece of wood, which, upon a trial made with a blast-pipe, proved incombustible.

Sir WILLIAM PETTY⁴ promised to send for some of the pieces of a rock in Wales like incombustible wood.

Mr. BOYLE undertook to try the compression of air and water by his engine with quicksilver.

Mr. CROUNE was desired to bring in an account of his experiment of bladders and water.

Mr. HENSHAW read his *History of the making of saltpetre*, for which thanks were returned to him; and it was ordered to be registered⁵, and was afterwards published by Dr. SPRAT⁶.

Sir ROBERT HARLEY was proposed a candidate by Mr. SLINGESBY.

Sir JOHN FINCH's piece of an incombustible hat-band was produced.

Mr. COLWALL read his *Relation concerning the making of alum*, for which he received the thanks of the society, and his paper was ordered to be registered⁷.

Sir WILLIAM PETTY was desired to bring in the history of the dyers trade; which he promised to do.

Sir THOMAS NOTTE, Sir ROBERT HARLEY, Mr. WILLIAM AERSKINE, Mr. STANLEY, and Mr. ELLISE were elected into the society.

⁴ He had been knighted on the 11th of April, 1661.

⁵ Register-book, vol. i. p. 50.

⁶ Hist. of the Royal Society, p. 260.

⁷ Register-book, vol. i. p. 83. It is printed in the Philosophical Transactions, vol. xi. n° 142. p. 1052.

Mr. CROUNE was desired to procure salt of cabbage, and to try, whether it would destroy the taste of wine, as it was reported to do.

Mr. BOYLE presented the society with the Latin translation of his *New experiments physico-mechanical touching the spring of the air and its effects*.

Dr. CLARKE read a paper entituled, *Observations on the humble and sensible plants in Mr. CHIFFINS's garden in St. James's Park, made August 9, 1661; present the lord Brouncker, Sir ROBERT MORAY, Dr. WILKINS, Mr. EVELYN, Dr. GODDARD, Dr. HENSHAW, and Dr. CLARKE: which was ordered to be registered*^a.

August 28. Mr. BOYLE presented the society with the book, which he had published since the order was made, that every member, who should publish any book, should give one to the society's library.

The experiment made by Mr. CROUNE with a bladder and water in it was directed to be farther prosecuted against the next meeting; and the result of it committed to writing.

Mr. OLDENBURG read a part of a letter from Mr. BORRHI, concerning the making of incombustible wood.

He also tried the experiment of salt of cabbage in wine, but it did not succeed according to the report, that it would make wine insipid; though it much abated of the taste, and made it a mixture of vinous and lixivious.

It was supposed, that all lixivate salts would do the same.

Sir CYRIL WYCHE and JASPAR NEEDHAM, M.D. were admitted into the society.

Dr. POCKLEY was proposed as a candidate by Dr. WILKINS.

The description of the island Hirta was brought in by Sir ROBERT MORAY, and was ordered to be registeredⁱ.

September 4. Sir CYRIL WYCHE and Dr. NEEDHAM subscribed their names.

Mr. MUNGO MORAY was proposed as a candidate by Sir ROBERT MORAY.

A proposition of Mr. HOBBS *for finding two mean proportionals between two strait lines given*, was delivered into the society by Sir PAUL NEILE from the king, indorset with his majesty's own hand, and was ordered to be registered^a; as was afterwards the answer to the problem, by lord viscount Brouncker¹.

^a Register book, vol. i. p. 90. It is printed in the Philosophical Transactions, vol. xi. n^o 137. in Mr. Hook's Micrographia, p. 66. P. 927.

¹ Register-book, vol. i. p. 95. It is printed in

^a Register-book, vol. i. p. 99.

¹ p. 101.

Mr.

Mr. CROUNE shewed his experiment with bladders and water, which succeeded very well; and he was desired to bring in an account of it in writing.

Sir KENELME DIGBY communicated a letter from a friend of his in Florence, written in 1656, concerning a petrified city and inhabitants^m; which was ordered to be registeredⁿ.

He read also a French letter from Monsieur FRENICLE to himself, dated at Paris, the 31st of August 1661, N. S. concerning that gentleman's hypothesis of the motion of Saturn^o; and was desired to write to Mr. FRENICLE, and to return him the thanks of the society.

Mr. WREN was desired likewise to deliver a copy of his observations and hypothesis of Saturn to the amanuensis, to be transmitted by Sir KENELME DIGBY to Monsieur FRENICLE.

Mr. CROUNE was requested to procure a syphon of glass to be made, with the end nipt up, in order to try the compression of air with quicksilver; and also to try an experiment with the weight of liquors in a syphon.

Sir KENELME DIGBY was desired to draw up some notes upon Mr. HENSHAW's *History of making saltpetre*.

The amanuensis was ordered to make against the next meeting the experiment with spirit of wine, and a wax-candle, to be burnt in it in a porringer.

Col. TUKE delivered in a Latin letter from Monsieur de SORBIERE, secretary of the academy at Paris, to Sir ROBERT MORAY, president of the society; and another in French from the same gentleman to Col. TUKE; both which letters were read by Col. TUKE, and ordered to be registered^p. The former was in answer to Sir ROBERT MORAY's letter to Monsieur de MONTMOR, inserted above, and was in these terms:

Nobilissimo ac sapientissimo viro D. MORO equiti, & celeberrimæ academæ Londinensis præfici præfidi, SAMUEL SORBERIUS, χαίρειν καὶ εὐφρατῶν.

"Cum ad virum illustrem dominum HABERTUM MONMORIUM perlatae fuerunt epistolæ tuæ, nobilissime domine, tota in iuctu & mœrore jacebat familia
"Monmoriana, ob ægritudinem matris-familias, quæ nondum planè convaluit, &
"liberiorum mortem. Ego autem in aulâ versabar; plerique unâ philosophantium
"rus concefferant (ut moris est Lutetiæ eâ anni tempestate): cœtus eruditorum
"nullus erat; & omninò jacebant studia nostra philosophica. Primus omnium
"in urbem redii, sed forsan quamprimùm profecturus iterum, rebus scilicet non-
"dum in ædibus Mæcenatis nostri juxta vota nostra ritè compositis, & amicis
"adhuc nonnullis vel in Armonicam regem comitantibus, vel ad alia privata nego-

^m Probably that supposed to be in Africa.

ⁿ It does not appear in the Register.

^o Letter-

book, vol. i. p. 13.

^p Letter-book, vol. i. p. 4 and 6.

"tia procul ab urbe intentis. Itaque D. MONMORIUS, qui in illo animi angore,
 "in quo luctatur nunc cum morborum cohorte, quæ donum illustrissimam ob-
 "det, par sibi non videtur adornando tibi responso, iussit ut calamo manum ad-
 "moverem, & in ejus partes aliquatenus venirem. Id ego muneri libenter in
 "me suscepi, qui nihil prius habui à puero, quam ut summos viros adirem, mi-
 "rarer, cultus mei ceteriores facerem, & hisce sanctus officii doctior demum vel
 "melior evadærem. Gratias igitur tibi, vir doctissime, præses noster sapi-entissi-
 "mus debitas per me refert; uberores olim redditurus, cum nova rerum facies
 "lætiorque redierit. Et magno quidam lucro optimus ille virorum apponet, at-
 "que summo honori ducet, si ea semper mens nobilissimo & eruditissimo consessui
 "vestro consisterit, ut cum nostro qualicunque literarum commutatio fiat, atque
 "adeo experimentorum & ratiociniorum circa res phyficas communicatio. In
 "ista autem ἀλλοτρίω verendum tibi foret, vir illustrissime, ne aurea pro
 "æneis rependeres, si in ea opera semper uti constitutum esset, vel si eo, quo nunc
 "se habent, modo studia nostra semper procederent. Verum speramus, alacriores
 "nos brevi ad intermissa opera redituros: nec desunt enim nobis viri præstantissimi
 "ad strenuè agendum parati: sed, ut rem ingenuè eloquar, desunt nobis, quod in
 "primis invidendum venit Angliæ vestræ fortunatissimæ, magnates & principes,
 "qui regem in amorem studiorum istorum pertrahant, vel qui ipsi talibus studiis
 "capiantur. Quam pauci enim sunt MONMORI, SOURDISII, LAUDUNENSES episcopi,
 "qui musis litent, & sumptus nonnullos ad promovenda viarum humanarum com-
 "moda non refugiant! O vos felices! quibus referta est hujuscemodi viris patria;
 "quibus rex serenissimus, ceu benignè fulgens sol, præluere dignatur; & quibus
 "datum est non solum sagacitate ingenii, sed iteratis experimentis, & in universum
 "orbem terrarum longè latèque diffusis sapientiæ vestræ radiis, ausu præclaro &
 "immortalitate digno, talia tantaque suscipere! Patere, vir nobilissime, ut de-
 "inceps te & cæterum tuum illustrissimum eminens colam; atque, si datur ali-
 "quando proprius Deos contingere, & in Angliam, quod jam pridem gestio,
 "transcurrere, obsequii & cultus mei, non certiora quidem, sed evidentiora pig-
 "nora tradere. Ita valeas exopto, & cœptis tuis lausta omnia adprecor. Lu-
 "tetie Parisiorum a. d. vi. Kal. Sept. A. S. R. CIOIOCLXI."

After reading this and the other letter of Monsieur de SORBIERE, a book was ordered to be provided for the registering of letters only.

Dr. GODDARD was desired to bring in writing an account of the experiments made by him in the great water-tube with glass-windows.

He then made an experiment with two cylinders of glass, one within the other, with quicksilver and water; causing by five ounces of water eight or ten grains of quicksilver to rise an inch and a quarter high.

Mr. BOYLE was desired to bring in at the next meeting his experiment of this kind.

It was ordered, that a collection of all quicksilver experiments be made, examined, and brought in by Mr. OLDENBURG.

Mr..

Mr. GREATERICK's compression of water was promised against the next meeting.

September 11. Sir THOMAS NOTTE, Mr. WILLIAM AERSKINE, and the lord MASSARENE subscribed their names.

JOHN CLAYTON, esq; was proposed as a candidate.

RICHARD JONES, esq; was admitted and subscribed his name.

Mr. MUNGO MORAY and Dr. POCKLEY were elected.

It was resolved, that Sir WILLIAM PETTY be put in mind to prosecute his demonstrations about ship-building.

Two committees were appointed to propound experiments, one consisting of Dr. GODDARD, Dr. WILKINS, Dr. ENT, Dr. WHISTLER, and Mr. CROUNE, for the city of London; and the other consisting of the lord viscount BROUNCKER, Sir ROBERT MORAY, Sir PAUL NEILE, Mr. SLINGESBY, and Dr. CLARKE, for Westminster.

Mr. CROUNE produced two experiments, one of the compression of the air with quicksilver in a crooked tube of glass, the nipt end of which broke; and the other with a cork kept down at the bottom of a cylinder of water in a vessel perforated at the bottom, over which the cork was laid; upon stopping of which foramen, and the pouring in of water, the cork immediately rose.

Mr. BOYLE gave an account of his having made the former of these experiments by compressing twelve inches of air to three inches, with about an hundred inches of quicksilver.

September 18. Dr. GODDARD was desired to continue his experiment of water.

It was resolved, that the petition, which Sir ROBERT MORAY read to the society, be delivered to the king in the name of the society.

The experiment was made of spirit of wine and the end of a wax-candle, the flame of which was not orbicular, as it had been said it would be, nor turned round; but after a while the candle was extinguished, the spirit continuing to burn.

The solutions of several salts were ordered to be tried in one liquor.

Mr. BOYLE brought in his account in writing of the experiment made by him of the compression of air with the quicksilver tube; which was ordered to be registered.

Sir KENELME DIGBY read a letter in French from Monsieur CHRISTIAN HUYGENS DE ZUYLICHEM to Sir ROBERT MORAY.

The lord viscount BOUNCKER was desired to try the acceleration of falling bodies by pulleys or otherwise :

Dr. HENSHAW to try to sink a glass in Dr. GODDARD's engine for immersion.

Dr. WILKINS remarked, that he thought, that he could make it appear, that the bladder of a fish did not contribute to its swimming.

Sir ROBERT MORAY was desired to try, whether the same weight, that will sink a board edge-wise, will sink it flat-wise.

September 25. Mr. CROUNE was desired to try some experiments of the weights of liquors :

The lord viscount BOUNCKER to make the experiments of two pendulums :

Dr. GODDARD to prosecute his trials of sinking bodies under the surface of the water :

Dr. CHARLTON to try the experiment of the freezing of salt water.

Sir WILLIAM PETTY promised his discourse on clothing.

October 2. Sir ROBERT MORAY produced unnealed glass hollow balls with a small hole in them ; which being held in the hand till they were heated (the hole thereof being stopped with the palm of the hand) would fly into pieces.

The lord viscount BOUNCKER was desired to try the experiment of two pendulums :

Dr. GODDARD to try the velocity of sinking bladders in water, and the lord viscount BOUNCKER in air :

Dr. ENT to give in writing some considerations, why it is hotter in summer than in winter.

It was resolved, that it be debated at the next meeting about appointing or altering the time of the society's meeting.

Dr. GLISSON subscribed his name.

The amanuensis was ordered to provide against the next meeting two balls of equal bigness, the one of lead, and the other of cork.

He

He promised to procure a stone, which being opaque would grow transparent in cold water.

October 9. A living chameleon was presented to the society from Mr. CLAYTON by Dr. HENSHAW.

Mr. POVEY proposed to the society to procure a correspondence in Africa.

Mr. CROUNE, Dr. POPE, and Mr. ROOKE were appointed a committee to view the propositions for inquiries in foreign parts.

Dr. ENT brought in his reason of the heat in summer, and cold in winter; which was read by the lord viscount BOUNCKER, and ordered to be registered in a book of theories, which was directed to be provided.

Mr. CLAYTON was admitted into the society.

The lord viscount BOUNCKER read a letter of Dr. CHRISTOPHER WREN¹ to Sir PAUL NEILE, concerning his hypothesis of Saturn; which letter was ordered to be entered in the letter-book². It was dated at Oxford, October 1, 1661, and was as follows:

“ HONOURED SIR,

“ You know of what prevalency your commands alone are with me, although they had not been seconded by the votes of the best society of Europe; to disobey which would not be rudeness alone, but Gothism and enmity to the progress of learning. Yet if it were not my resolution, that I ought to suffer any thing rather than be deficient to so much duty, you should not have obtained of me to expose myself so many ways, as I must of necessity do in this little trifle, the hypothesis of Saturn. For had it been so fortunate to come into your hands, while it could have told you any news, it might possibly have been as well received as the first messenger of a victory is wont to be, though he brings but an imperfect story. But when HUGENIUS hath outrid me, who stayed to bring a fuller relation, to give you a stale account will undoubtedly be as pleasant a thing to you, as unseasonable well-meanings are wont to be, but cannot give you any serious satisfaction. I must confess, I have often had the pusillanimity rather to neglect that right I might in justice have vindicated, than by challenging it too late, incur the jealousy of being a plagiarist. And since you it is, that will not suffer me to continue in this peaceable humour, I shall not need to fear, that you will entertain any such suspicion, especially since this kind of Saturn was long before hatched by your influence at White-Waltham, upon the observation of December, 1657, when first we had an apprehension, that the arms of Saturn kept their length, which produced this hypothesis, made first in two past-boards; not to say any thing of our attempts in wax, in Jan. 1655.

¹ He was created doctor of the civil law, Sept. 12, 1661.

² Vol. i. p. 16.

“ The

" The hypothesis made more durable in metal was exposed on the top of that obelisk, which was erected at Gresham College in May, 1658. (if I mistake, be pleased to rectify me) to raise the thirty-five feet telescope of your donation.
 " At the same time I was put upon writing on this subject, for which I supposed I had tolerable observations and materials at hand. But first, I was enjoined to give that short and general account of it, which about that time I drew up in this sheet. But when, in a short while after, the hypothesis of HUGENIUS was sent over in writing, I confess I was so fond of the neatness of it, and the natural simplicity of the contrivance agreeing so well with the physical cause of the heavenly bodies, that I loved the invention beyond my own: And though this be so much an equipollent with that of HUGENIUS, that I suppose future observations will never be able to determine which is the truest, yet I would not proceed with my design, nor expose so much as this sheet any farther than to the eye of my bosom friend, to whom even my errors lie always open. Neither had I now been persuaded to it, but that I could not endure a regress in a real learning, having always had a zeal for the progress of it: And to see ingenious men neglecting what was determined before, to do worse on the same subject, because they would do otherwise, was always wont to make me passionate: And therefore I could not, with charity, suffer a person (whose great wit usefully tried would be a loss to the world) to trouble himself with this less considerable hypothesis; which if he had known not to be new, he had certainly despised: And yet it is very well advised of him, that we should not so build upon HUGENIUS's hypothesis, as to neglect the observations about the full phases; which, till they are obtained, little more can be determined in this thing, than what HUGENIUS hath done. And therefore, though I might have taken occasion, together with this old paper, to have lent some thoughts, and have suggested some new hypotheses; yet considering they would as yet be but mere conjectures, I have let alone those thoughts. And if it be suspected, that any thing said in this superficial draught of Saturn be of this sort, that is, contrived since the seeing of HUGENIUS's, I have a double appeal to make; one to my honoured friend Mr. ROOKE, who at first saw the only copy; and another to the style, which speaks I had not yet used the industry to refine it, above what might have proceeded from my childish pen, having not then been so sufficiently convinced of the necessity of words as well as things: neither would I change it now, that I might be conscious to myself of sincerity, but where too much obscurity in the expression only forced me in two or three places.
 " For these reasons, I earnestly beg this favour of you (as a friend I desire it) that you would keep it in your hands, and restore it again; which, as the case stands, will give me almost as much satisfaction, as if I had found the confidence to have excused myself, when it was enjoined me at the society; which I might well have done, considering that divers there had been at the trouble to hear the astronomy reader at Gresham give fuller discourses on the same subject, which he thought then was publication enough, and might have saved

" The original manuscript of a lecture of his read at Gresham College, intitled, *De corpore Saturni quæque phasibus hypothesis*, was in the library of the late WILLIAM JONES, esq; F. R. S.

which library is now in the possession of the right honourable GEORGE earl of Macclesfield, president of the Royal Society.

" the impertinency of these apologies for that, which he thinks deserves not now
 " so much of his care, otherwise than as it is a command from them to

Oxford, Oct. 1,
 1661.

Your most obedient humble servant,

CHRISTOPHER WREN."

After the reading of Dr. WREN's letter, Sir ROBERT MORAY read one, in French, from Monf. CHRISTIAN HUYGENS DE ZUYLICHER, dated at the Hague, 24 July, 1661, N. S. containing some observations on Saturn^{*}; which letter was ordered to be entered[†]. In it he takes notice, That he had observed, for several days past, Saturn with his telescope, and had seen distinctly, that there was not the least part of the globe of that planet, which advanced out of the oval of its ring, either above or below; which could not have been so, according to the proportion of the diameter of the ring and the globe, which he had laid down to be as 9 to 4. That he had found therefore, that it was necessary to suppose the ring greater in proportion; and that its diameter to that of the globe ought to be at least as 17 to 6. That he had procured a model of Saturn to be made with a circle of brass, like that which he had seen at Sir ROBERT MORAY's, but in the proportion above-mentioned; and having surrounded the whole with white paper, he found, that being seen at a distance, and well enlightened, it produced very exactly all the phases. He rubbed the paper with cha'k, which made it appear equally white throughout. He remarked in the same letter, that he had been informed by a letter from Paris, that the academy, which met at Monf. DE MONTMORT's, was excited again by emulation of the society of London, and would apply themselves to experiments preferably to any other employment, in which genius only was concerned. This, adds he, is a good effect produced from your example. He concluded with desiring to be acquainted, by Sir ROBERT MORAY, from time to time, with what passed in the society, for whose establishment and interests he declared himself no less zealous, than any one of the members, who composed it.

Oct. 16. Six balls of a like size were produced, one of lignum vitæ, one of stone, two of tin, and two of lead; to try their different velocity of sinking in water, or falling down in the air.

* Monf. HUYGENS had published at the Hague, in 1656, in 4to, *Systema Saturnium, sive de causis mirandorum Saturni phenomenon & comite ejus planetæ novæ*; in which he describes the various phases of Saturn, and shews, that the *brachia* or *anse* are no other than a luminous ring about the body of that planet, every way alike distant from it; and that the planet keeps in a certain and constant inclination to the ecliptic, appearing (according to its diversity of aspect) now like a large ellipsis, now like a more contracted one; at other times like a straight line: that there is likewise

a *lunula*, or small planet, moving about Saturn, and finishing its course in sixteen days: and that Saturn in a less space of time turns about its own axis, carrying about with him the whole ethereal body or matter between him and the said satellites or planet, together with the said ring, in a motion not much slower than his own. He published, the year following, at the Hague, in 4to, *Brævis descriptio systematis Saturnii*, in answer to *Explicatus de Divinis*.

† Letter-book, vol. i. p. 19.

VOL. I.

II

Dr.

Dr. POPE⁷ made his experiment of breaking pebbles with his hand; which succeeded very well.

Mr. OLDENBURG read a paper concerning a liquor to be had out of animals like the alkahest⁸; which was referred to the physicians of the society.

It was ordered, that salt of tartar, vitriol, common salt, salt-petre, and alum be dissolved in water, in order to see whether they increase in bulk.

Mr. GREATORICKS tried what he could do in the compression of water; but being not then prepared, he did not succeed.

Dr. NEEDHAM proposed the Indian varnish.

Dr. MERRET and Sir WILLIAM PETTY were desired to bring in their account of dying.

Dr. WHISTLER promised to communicate his account of springs.

Sir ROBERT MORAY acquainted the society, that he and Sir PAUL NEILE had kissed the king's hand, in the society's name; and he was desired by them to return their most humble thanks to his majesty for the reference, which he was, leased to grant of their petition; and for the favour and honour done them, of offering himself to be entered one of their society.

Oct. 23. Dr. WILKINS president.

It was ordered, that it be referred to Dr. GODDARD, to make inquiries about the liquor of animals like the alkahest.

Mr. ROOKE, Mr. CROUNE, and Dr. POPE, were requested to make the experiment of the dissolution of salts against the next meeting.

Dr. NEEDHAM promised to communicate an account of Indian varnish at the next meeting.

Dr. MERRET and Dr. CLARKE were desired to bring in their account of trades at the next meeting:

Dr. GODDARD to give in writing a brief account of his observations made in the dissection of the chameleon.

Mr. CROUNE read some account of experiments of mercury made by Dr. POWER⁹,

⁷ He had been created doctor of physica t Oxford, 12 Sept. 1661.

⁸ A word invented by PARACELIUS to express an universal menstruum or solvent.

⁹ HARRY POWER, M. D.

at the bottom and top of Hallifax-hill; which account was ordered to be filed up. He was desired to provide, against the next day, a glass tube, and to bring in an account of the bladders; and to examine the mechanics of SCHOTTUS^b, as Mr. ROOK^c was the sounds, and Dr. POPE the optics, of that writer; and to consider what experiments mentioned by him are worth trying, and to propose them to the society.

Oct. 30. Mr. CLAYTON subscribed his name.

Mr. CROUNE made the experiment of steeping the stone brought by the amanuensis into cold water; upon which it grew wholly transparent, and in the air it returned to its former opacity.

Dr. GODDARD delivered in inquiries concerning the liquor alkahest, made of animals; and they were ordered to be fairly written, and given to Mr. OLDENBURG.

It was ordered, that the description of the liquor alkahest be transcribed and kept: And

That the account of the solution of salts be called for at the next meeting.

Dr. NEEDHAM read the following account of China varnish; which was ordered to be registered^d.

“ A pint of the best rectified spirit of wine; gum lacca, the reddest and clearest, four ounces; sandaraca one ounce; put all into a bolt-head, close it well, and let them infuse the space of four and twenty hours upon sand gently hot; afterwards increase the fire, that it may boil a little, till the gums be thoroughly melted; then pass it through a fine cloth, and keep it in a glass well stopped.

“ The wood to be varnished must be smooth, clean, and neat (such as pear-tree) without fissure or holes; and if any be found, they must be stopped with a paste made of gum tragacanth, incorporated with some of the colour you intend to superinduce. Being thus prepared, and well smoothed, warm it by the fire, then lay upon it, thus warmed, a covering of varnish, with a reasonable large and very fine pencil.

“ When you would colour, add to the varnish about a seventh part as much colour as varnish, very finely ground; mingle them very well together with a muller, or smooth stone cemented to the end of a stick: then lay on four coverings of this mixture, drying it by the fire each time you lay it on.

“ If any bubbles arise, or the wood be unevenly painted, rub it smooth with dried pistle, i. e. the herb horse-tail.

^b GASPER SCHOTTUS, a jesuit, professor of mathematics at Wurtzburg in Francofia.

^c R. Gisler.

book, vol. i. p. 104.

“ Then lay on four or five couches more after the same manner, which is usually sufficient for the colouring.

“ When the last couch is well dried, rub it smooth with a linen cloth, or a piece of felt moistened with a few drops of salad-oil, and then dipped in fine powder of tripoli.

“ Then lay on two coverings more of the simple varnish, polishing, when it is dry, with oil and tripoli, as before; and last of all, rub it with a dry cloth, presse, or felt.

R E D.

“ Spanish vermilion finely powdered, q. v. Venetian lacca, a third or fourth part, well mixed.

B L A C K.

“ Lamp-black, ground with green vitriol.

B L U E.

“ Ultramarine; adding only twice as much varnish as colour.

J A P A N - C O L O U R.

“ Powder of avanturine: but first lay on one covering of varnish, then four coverings of varnish and colour mixed; then plane it with presse, tripoli, and oil: then lay on two couches more of varnish, and before the last is dry, sift on the powder of avanturine; give it fifteen or thirty couches more of varnish; plane it with a pumice dipped in oil, then with oil and tripoli, and lastly with a dry cloth.

“ N. Green takes no varnish.

G I L D I N G.

“ White-lead, umbre, and yellow ochre, part. æq. grind them well together, with as much oil as will render the compost reasonably thin; boil them gently almost a quarter of an hour; then lay it on with a pencil, and when it is dry, take up the gold with a little cotton, wet with your tongue, and so lay it on.”

Mr. CLAYTON promised to communicate to the next meeting his account of Indian varnish.

Mr. BOYLE was desired to give what he knew relating to varnish: And

Mr. OLDENBURG to write about the account of making steel and latten plates.

Dr. GODDARD read his observations of the chameleon; which were ordered to be registered.

^a Vol. i. p. 106. They are printed in the Philosoph. Transact. vol. xi. n^o 137. p. 930.

Mr. ROOKE was desired to procure two pendulums, one with cheeks, and the other without: And

Mr. CROUNE to write to Dr. POWER, that he repeat the experiment of the weather-glass and mercury at Hallifax-hill.

It was ordered, that in the solutions of salts, it be observed, whether the water increase in bulk or not: And

That a bullet be made of quicksilver against the next opportunity.

Mr. CROUNE made his experiment of the pressure of quicksilver on his thumb.

He was requested to draw up a scheme of his experiment of bladders.

It was ordered, that a trial be made, whether the stone brought in by the amanuensis, increased in weight, as it was represented.

November 6. Mr. CROUNE read his *Experimental account of the raising up of a weight hung at the bottom of an empty bladder*; which was ordered to be registered*.

Mr. EVELYN promised to examine the circular rings of trees.

November 13. Dr. WILKINS read a Latin relation of a maid in Holland, who voided seed by urine, which being sown grew.

Dr. GODDARD communicated an account of the experiments of a stone, called *Oculus Mundi*, brought in by the amanuensis; which account was ordered to be registered†, and was afterwards printed by Dr. SPRAT‡. The stone was found heavier when transparent than when cloudy.

The doctor was desired to try more experiments upon it.

The amanuensis cast a bullet of coagulated quicksilver.

Dr. WILKINS was desired to bring in writing his relation of a natural standard.

Dr. GODDARD was appointed of the committee to examine the solution of salts, and to observe the figures of their crystallisations.

Mr. OLDENBURG brought in an answer to Dr. GODDARD's queries concerning the liquor alkahist of animals.

THEODORE HAAK, esq; was proposed a candidate by the lord viscount Brouncker, JAMES LONG, esq; by Mr. BALLE, and JOHN HOSKYNs, esq; by Dr. WILKINS.

* Register-book, vol. i. p. 109. It was afterwards translated into Latin, and registered, vol. viii. p. 177. † Register-book, vol. i. p. 132. ‡ History of the Royal Society, p. 230.

Mr. PACKER and Dr. WILLIS were admitted into the society.

It was ordered, that the names of those, who propose candidates, be for the future specified.

November 20. Dr. WILKINS shewed the society the draughts of several insects, and read a letter from FRANCIS WILLUGHBY, esq; concerning their history: which letter was ordered to be copied.

Mr. WILLUGHBY was proposed as a candidate by Dr. WILKINS; and Monsieur LE FEBURE by Sir ROBERT MORAY.

Dr. WILKINS read his paper concerning a natural standard; six copies of which were ordered to be transcribed.

Dr. GODDARD was desired to make the experiment of vapours to be turned into air.

Mr. DE SERVIERE's paper of rareties was ordered to be copied.

Mr. CLAYTON brought in the following account of china varnish; which was ordered to be registered^a.

“ Take a choppin of spirit of wine, gum lac four ounces, sandarac one ounce: put them all in a matras-glass very well stoppt, and the drugs being very well picked, set in a B. M. the space of three days; then strain it through a fine linen-cloth, and keep it very close stoppt.

“ *N. B.* The spirit of wine must be the highest rectified. It will do better in a bolt-head sealed up hermetically. The reddest and clearest gums are the best.

“ *The way to lay on the varnish.*

“ First warm the wood by the fire, and lay on one covering of varnish with a big pencil. When you colour, take seven times as much varnish as colour, and mingle them well together; then lay on four coverings of the mixt colour, and dry it at the fire, whilst you may tell forty between every covering. If you go too near the fire, it will blister. Then with your finger put them down; then give it four coverings more; after rub it over with salad oil and tripoli with a linen-cloth. Then lay on two coverings more of pure varnish, and rub it with salad oil and tripoli: lastly, rub it with a fine linen-cloth: the more you rub it the better.

“ *To make the best Red.*

“ Take vermilion of Spain, with a third part of lac de Venise.”

^a Register-book, vol. i. p. 112.

November 27. Sir WILLIAM PETTY delivered in the following history of clothing; which was ordered to be registered¹.

Of making cloth with sheeps wool.

1. " The hair of the sheep (which we call wool, omitting other causes of difference) is different by reason of and according to the several parts of the sheep, whereupon it groweth.

" The finest (that is the smallest and smoothest pile) grows on the pole; the coarsest about the tail; the shortest on the head, and on some part of the belly; the longest on the flanks: the parts also of the same pile are different, the ends or ribs being more bristly than the ground.

2. " Wool is likewise naturally of several colours between white and black. Wool is either shorn, and so taken off in a whole fleece, or pulled off from the skin after the sheep is dead: this latter sort is commonly short and finer; if it be short, it is not used in cloth, unless mixed in fleeces, but rather in hats.

3. " The first operation upon wool is to sort it; that is, to divide the whole fleece into its several species according to its fineness, to cut the tarry parts, as also the ribs of coarse bristly ends.

4. " Being sorted, it is washed, if coarse, in ordinary water; if finer, in soap: then it is dyed in case you make medlies, otherwise it is wrought white into cloth, and the cloth dyed afterwards: for some colours make the wool more harsh and scabrous, and sometimes more rotten, sometimes less apt to be carded and spun, according to the nature of the stuff wherewith it is dyed.

5. " Cloth is either died in cloth or in the wool, the wool of medlies being a mixture of several colours, tempered as painters do their colours, so as to sample any pattern propounded: and sometimes cloth, or rather stuff, is made into a certain colour by weaving thereinto yarn or threads of several colours, as was said before of wool.

6. " When wool is mixed in locks, the next work is to bring the several hairs of it (which are indeed threads of themselves) to lie parallel to each other, in order to spinning, and to take them out of their natural curls, plexures, and contortuplications. The first help hereunto is oiling or faying of the wool, so as every hair being thereby made slippery, may change its side and position, as aforesaid, without so much force and pulling, as would break the staple.

7. " There is a just proportion of oil, left on the one side the wool break in the carding or combing, as aforesaid; or on the other side, it being unfit for spinning, as being too slippery to keep the twist, which the wheel gives it. The

¹ Vol. i. p. 113.

" use

“ use of oil likewise is to weaken the natural spring in the wool, for by the like
 “ art, the springs even of steel are weakened.

8. “ The wool being thus prepared with oil, is either carded or combed : the
 “ latter is performed with heat, whereby the hairs being once stretched out and laid
 “ parallel, are the less apt to curl up again ; for we see many things, as flaves,
 “ boards, &c. being bent whilst they are hot, do retain the same position wherein
 “ they cool.

9. “ That, which is common both to combing and carding (which answers also
 “ to the hatchelling of hemp and flax) is the drawing it through many wire-teeth
 “ over and over ; the which do hold it so gently, as that the wool is more easily
 “ drawn strait, than broken by lying across those teeth.

10. “ The instruments of carding and combing shall be elsewhere described.
 “ The use of carding and combing is also to break all knits and plexures, and to
 “ make the wool of an even consistence every where, which also resolves into lay-
 “ ing the fibres parallel, which they call stock carding.

“ Wool thus carded is carded over again with smaller cards by the spinners
 “ themselves, to bring it into long rows, and fit to be spun.

11. “ Spinning is a sort of connecting parallel bodies (suppose cylinders) by
 “ changing their figures alike, from strait to screws : for all twisted threads are
 “ screws. Now when one thread is thus locked into another, and when the na-
 “ tural spring of each is lost and settled in the screw-like figure, then putting or
 “ forcing it any other way, *viz.* strait, doth not disjoin them, no more than
 “ pulling a screw-pin strait-wise out of its nut doth draw it forth. This screw-
 “ ing doth also unite distant threads, and make such as lie parallel to lie angu-
 “ larly, and to decussate upon each other : these screwings do cause the threads so
 “ to pinch each other, that any thing interposed between the screwed or twisted
 “ threads, is held fast by them ; and the thing last interposing being also itself
 “ screwed, pinches and holds fast other things interposed, as aforesaid, & *fit de in-*
 “ *ceptis in infinitum.* And this series of continual twillings and interposings, whe-
 “ ther things are joined or fastened to each other singly by, is the very essence and
 “ *ratio formalis* of spinning.

12. “ The usual instruments and tackling for spinning is a wheel, a wheel-
 “ band, a whuzzle, or shiver or spindle, a quill and carriers, with other small sub-
 “ convenient instruments for regulation of each of these ; whereof we shall speak,
 “ when we treat of all the several ways of spinning used for ropes of hemp, straw,
 “ shavings, hair, threads of wool, flax, cotton, throistering of silk, making of lute-
 “ strings, twilling of crewel ; where we shall note, that drawing of wires is another
 “ species of filamentation, and not at all spinning.

13. “ Cloth is made of thread or yarn, by joining many of them placed parallel
 “ together with another single thread. Now this connexion is made only by alter-
 “ ing

“ ing the figure of the threads so joined, though not by screwing them as before,
 “ but by alternate crooking them out of one strait line into many semi-circles or
 “ other curve lines, alternately convex and concave.

14. “ But knitting, as that of stockings or quilting, is made by one single thread
 “ disposing itself into a superficial tela, by assuming peculiar figures for that pur-
 “ pose, unto which also most needle-works and making of nets are to be referred.

15. “ But where many threads, at first placed parallel, or joined together by
 “ their ends, are bound together by themselves, and not by one common thread,
 “ as in cloth, that operation makes laces, woven silk stockings, &c. of all which
 “ in their places.

16. “ As to cloth, the parallel threads above-mentioned are called the *Stamen*, in
 “ English, the warp, or the chain: the multitude of these is according to the
 “ breadth of the cloth.

17. “ The twisting of the yarn for a chain, ought to be somewhat harder than
 “ the woof. The woof is that infinite thread, which (by running over and under,
 “ forward and backward, and that too in a very various alternation through the
 “ chain) makes the chain into cloth or tela. This woof is more slack spun, and
 “ consequently, though it have no more wool in it (length for length) than the
 “ warp, yet it appears bigger, softer, and finer. The warp also must be of a long
 “ stapled wool, whereas the woof needs not, for the reasons, which shall hereafter
 “ be shewn.

18. “ The operation, whereby yarn is brought off the spinners quills, and made
 “ into skains (which is called reeling) and that other operation, whereby from
 “ skains it is brought into a chain fit to be turned on upon the loom (which is
 “ called warping) I omit only at this time.

19. “ Supposing we have now a chain of fit and proper wool and spinning,
 “ both which must be different from that of the woof, as aforesaid, the next busi-
 “ ness will be, how to stiffen this chain, and thereby to strengthen it. For if this
 “ chain, consisting of above a thousand, sometimes of two thousand parallel threads
 “ (as in your broad-cloths) should be very apt to break, and to slip out of the har-
 “ nefs, it is easy to imagine the hindrance which must ensue. The stiffening there-
 “ fore above-mentioned is intended not only to prevent breaking, but also in case
 “ of breaches, by making the yarn (otherwise limber) to become as a bristle, to
 “ make it more easily put through the harness, which is a very complicated ma-
 “ chinament made of threads, and is the subtlest tool used about weaving.

20. “ Coarse yarn, such as is used in kerseys, is stiffened only by steeping the
 “ chain in chalk and water for a few hours, and then stretching it out to dry in
 “ the sun; in which posture, by a dextrous twisting and letting fly the whole chain
 “ together, they break out all the grosser particles of the chalk again, viz. such as
 “ stick to the outside of the yarn, and are not received between the very fibres of
 “ Vol. I. I the

“ the wool. Sarges are stiffened with a size made of white leather or parchment shreds boiled in water.

21. “ When the chain is thus stiffened, turned on upon the loom, and in weaving, then they take off the stiffness again gradually between the sley and the temples in the shuttle's way, partly to make the shuttle run; but rather this unstiffening is to make the yarn more flexible, so as the threads may accommodate themselves each to other the better, and so be more easy to slide and be driven close together by the strokes of the sley and lath, and consequently require the less thickening afterwards in the mill, which is very dangerous, in case the cloth be made of such wool, as is subject to waste in the fulling; that is, to spend itself into flocks: I say, in this case, the cloth must be home drove in the loom, and consequently always contributing to the shutting together of the threads (such as the above-mentioned untwisting of them is) must be used.

22. “ The chain is untwisted and made more slippery, in order to the shuttle's swift and easy motion, by drawing a brush wet in very strong brine over the chalked chain, and by applying black soap to the sized chain.

“ This discourse of untwisting the chain is extraneous, in reference to the order of proceeding, and mentioned here, by reason of the affinity of unstiffening to stiffening: but after the stiffening of the chain, the next thing to have been spoken of should have been, turning it on upon the loom, whereunto we come next, the which because I fear words will not describe, I shall not speak to it at large. In brief, the turning on the chain is to lay, suppose two thousand threads side by side, parallel to each other, and in the same plain, and wind them in this position many turns (without entanglement) about a rowl, which is called the yarn-beam; the which threads being a chain, did lay side by side like a sheaf of sticks or corn-straws.

23. “ The next work is to pass the end of all these threads through the harness and the sley, and then to knit them to certain other thrum-ends, which drive themselves from the cloth-beam, whither these threads must be successively drawn as fast as by weaving they become cloth; so that now we come to the sley and the harness, in which lies the most curious enquiry in the whole business of weaving. I cannot by bare words venture to describe them but by their uses.

24. “ The harness is the instrument, whereby many threads fastened into one strait line by their ends, and all lying in one and the same plain, are in a moment drawn from each other, so as the one half of them alternately shall gape and part, and make an angle to the other half, or shall thus gape in any order or proportion of threads assigned, be the same never so various; for such variety the weaving of flowered stuffs doth require: the beauty of all which works, and of all the difference of wales (which in few two stuffs is alike) is due to the harness and its appertinances the treadles.

25. “ The

25. " The flay is an instrument somewhat like two combs joined together by the ends of their teeth, and is made of the outward cortex of canes or reeds placed parallel to each other, in number answering to the number of threads of the species of cloth which is to be woven, and fastened at each end unto two other sticks with a waxed thread. The use of it is to drive the woof home, after that by the help of the harness it is duly placed between the threads of the chain; for by entering between every particular thread of the chain, it is able to do the same.

26. " The next great instrument of weaving is the shuttle, whereof also is great variety: the use of it is to throw or dart a limber weak thread in a moment, croses the whole chain in a direct line. 'Tis made of heavy, hard, smooth-grained wood; heavy, for its more steady motion; hard, to prevent wearing, which the frequent and transverse attrition it continually endures would soon do, as witness the shoeing of them with strong wire; and smooth-grained, to prevent splints and its catching on the chain. It hath a hollow belly, to contain the quill of yarn which it carries. It hath two gudgeon-holes at each end of this belly, to take in the axis of the quill: at one hole is a spring to let in and out this axis; on the other side of this belly is a hole shod with a ring of wire, to let out the thread from the quill always at the same angle, to which purpose the quill is too short for the axis whereon it rows, and moves as shuttley upon it as may be; the yarn unwinds still at the same angles, viz. right angles, that the swift motion of the shuttle may not in an instant, and not gradually, tear off all the yarn from the quill together.

27. " To which purpose there is somewhat considerable in the winding the yarn upon these shuttle-quills, which is done, first by covering the quill, as if it were woulded like a broken bow, or fished-mast of a ship; then forming two little double cones at each end, which the quilling boys call naps, leaving a kind of circular valley between them; and then by continual and even turning and woulding from one nap to the other, to finish up the whole quill into a double cone, or two cones joined by their bases. This is so nice a business, that the poor boys, who work at it, do often feel the penalties of miscarriage.

28. " To this quilling is necessary a wheel and band, spindle, whur and beards; a quill box with sloping cheeks, to fit several spindles; a swift or tympanum, with a block or spindle, whereon it moves horizontally. This swift is made of willow-sticks, cut like the sails of a windmill, set together like the braces-strings of a drum, joined at the head and bottom with smooth arms running through distinct holes in a block, both at top and bottom. The ingenium of it is, to admit skains of yarn of any bigness, and keep them to any height, that the spindle of the quill shall require; for the skain must lie always somewhat lower, so as to bind the quill, that it may not unravel or run out all at once, as aforesaid; and yet not to bind so hard as to break in shooting, rather than to run out kindly and gradually.

29. " The quiller keeps always one hand upon his thread to direct it upon the
 " quill, and also to moderate the binding above-mentioned. To do this in a just
 " proportion very swifly, requires a pretty dexterity.

30. " I have been perhaps too long in describing the minutiae of very ordinary
 " and small operations ; but I hope no philosopher will despise this, no more than
 " he would the anatomy of a mouse or frog ; for as small, and as common, and
 " as cheap as these are, I do not doubt but the invention of them was very difficult
 " and curious at the first.

31. " For, 1st, to bring curled, complicated, and entangled hairs to lie parallel,
 " strait and even, and so to remain, notwithstanding the strength of their natural
 " spring and resiliency, which is carding :

" 2dly, To bring a curled knot of any matter into a long even cylinder, which
 " is spinning :

" 3dly, To bind a thousand several threads together with one single thread, so
 " as to make a tela beautifully variegated in its superficies, which is weaving :

" 4thly, To dart or shoot a long, weak, limber thread to a certain distant point
 " or scope, which is the shuttle-work of the weaver :

" I say, to perform all these compounded operations with some one simple regular
 " motion, as that of carding, and spinning, and weaving are, is not contemptible,
 " nor easy for a very inventive wit, without deep and long meditations to excogitate.

" I have hitherto most imperfectly described the making of cloth so far as to
 " bring it to the loom, having purposely omitted the fabric of many an useful
 " tool, yea, even of the cards, wheels and the loom itself.

32. " In the next place we are to proceed to burling, scowering, milling, tenter-
 " ing, rowing, sheering, cottoning, and pressing, and even to the folding and pack-
 " ing of the cloth woven as aforesaid, the chief whereof is milling and sheering.

33. " After weaving, the next operation is burling, which is no more than pick-
 " ing out the knots, which the often breaking of the yarn, both warp and woof,
 " doth occasion in the weaving. The ingenuity of this work lieth chiefly in iron,
 " wherewith it is performed, resembling a duck's bill, but much sharper ; the
 " two chops whereof are opened by the springiness of themselves, joined in an
 " angle at one end, but shut with the hand of the user. This instrument catches
 " hold of the knot, and having gently raised it from the body of the cloth, nips it
 " off. The dexterity of this work is in raising no more of the knot than needs
 " must, least by pulling out too much thread the cloth be weakened.

34. " The next work is scowering the cloth from the oil, chalk, dying-stuff, as
 " also from the accidental foulness got into it in its passage through the many hands
 " and

“ and shops aforementioned. And this is performed with fullers earth, and sometimes with urine, and swines dung (all or some whereof answers to soap in ordinary washing) and with the beating of the mill, which answers to rubbing in the same ordinary washing: for if it be hard labour to wash small linen, it cannot but be thought work for a great engine, and not a man, to scower things of so large dimensions as pieces of cloth are. Nor would the charge of this scowring be tolerable, unless it could be performed (as it is) with engines instead of mens labour; and with the natural and cheap abstersives aforementioned, instead of artificial soaps made with strong lixivia and unctuous matters, either oil or tallow: for, indeed, the best Wooburn earth resembleth Cattle-soap not obscurely, that and all other scowring earths consisting (as near as I can guess) of very fine sand, answering to the salt in soaps, and of a fat matter answering to the tallow or oil condensed by coction, which are the ingredients of soap. The oily part of all these abstersives serve to insinuate the whole between the abstergendum and the fordes, and to lubricate the motion of the fordes from the abstergendum; and the salt or arenulæ serve as ten thousand little scraping knives acted by the friction of one's hands or other engines upon the abstergendum, wherewith to take off the fordes; and, lastly, the water used in all scowrings serves not only to attenuate and disperse the absterfise equally, but also to receive the fordes, and by continual giving place to fresh cleaner water, to carry off the whole absterfium until itself at last come off clean, which last washing is called rinsing, from the Dutch word *Rein*. The rarity of these absterfise earths is, that, though they be composed of innumerable little sands, yet have they no great ones, much less stones, which is the bane of earth otherwise good enough. Now it is easy to conceive, how pernicious it would be to a cloth, if but one small sharp stone were thrown into the fulling stock or alveus, wherein the cloth is violently beaten, as it lays in folds; for although one stroke of the mill might strike a hole, not above three or four leaves thick at a time, yet by repeating the same mischief perhaps near a thousand times in an hour, the cloth may, in as many hours as are required to this work, probably be beaten all to pieces.

35. “ Having thus touched the ingredients of scowring, we should now describe the mills; the peculiar ingenium whereof lies only in this, that the head or hammer is so fitted in its figure to the stock, box, or alveus wherein the cloth lies, that though it strike massy blows, yet it doth not tear the cloth; but turns it over gradually and equally at every stroke a little, which figuration deserves a large description. The main ingenium of the work is, to place the cloth hand-somely in the mill, for the purposes above mentioned, and to put in the ingredients from time to time, as the work requires it.

36. “ Having scowred the cloth (which may be done leisurely, and without such violence as heats it much) we now come to fulling, which is a motion of the same nature with that of scowring, but much more vehement, steady, and continued: the mill-stock being wrapt up warm, that the cloth may not cool, until the whole work be finished. This work must be carefully attended by a person able to remedy the accidents, of not proving, that is, not shrinking; wasting, that is, when the substance of the cloth works off into flocks, or else tearing: “ Which

“ Which is done partly by moderating the heat and motion of the mill, mending
 “ the position of the cloth into the stocks, and by throwing in oatmeal, earth, and
 “ fig (that is stale urine) &c. at convenient times, of which, as we digressed to
 “ give our conjecture of the nature of absterfion, so now we shall do the like of
 “ fulling.

37. “ Fulling therefore is making the cloth to become thicker with the dimi-
 “ nution of its other dimensions, and the covering of its threads so, as the cloth
 “ shall seem to be translated from the likeness of a tela (all whose threads appear)
 “ to that of a hat, which have no threads at all; for, by the way, the making of
 “ a hat is the making of a tela, without spinning or weaving, by a kind of fulling
 “ nor unlike this we now speak of, in the ratio firmalis of it.

“ This thickning is made by the shortning of the threads; this shortning of the
 “ threads by the twisting of them; this twisting by the heat of the mill (for such
 “ effect visibly hath heat on hairs, &c. some of which is wool); this heat of the
 “ mill is excited rather by an equal motion than by fire and scalding water, as in
 “ hats; and the constriction is furthered by oatmeal, earth, and urine, which are
 “ less potent than the astrigent powders and liquors used about hats.

“ By the twisting and beating aforementioned (as in making of feathers it is
 “ visible) some piles cleave, swell, and rise; those piles rising numerously out of
 “ all parts of the yarn, catch hold of each other, and twisting themselves together
 “ likewise do draw the threads, out of which they sprang, closer to each other.
 “ Finally, all this heat doth intenerate and make glutinous the piles of the wool
 “ (as appears in working of hornes and making glue of skins) so as they cling to
 “ each other. Now these piles, binding themselves by a double way of connec-
 “ tion, viz. this and that of twisting (either whereof might serve) they become
 “ good cloth, whose excellency it is to be like a felt or parchment, that is uniformly
 “ close and dense in all its parts.

38. “ When the cloth is taken out of the mill, the holes happening in that
 “ work are drawn up, that is, sewed up by a peculiar kind of stitch, which, al-
 “ though it be most strong, doth not at all discover the thread, wherewith it is
 “ made, nor the holes, where the needle goeth in and out, nor any puckring, where-
 “ by either may be discerned: but of this, when we handle the great variety of
 “ stitches and seams in all the usual and useful sorts of needle-works.

39. “ The next work is racking or tentering the cloth, which is no more than
 “ making the cloth (which becomes uneven in the milling) to be all of one
 “ breadth, strait and smooth; and this is performed by setting it in a frame,
 “ which we call tenters, such as are to be seen in many fields about London,
 “ wherein (it having a windless at one end) it is first strained to its length, then af-
 “ terwards to its breadth and parallelism, by setting the lower chap of the tenter
 “ (whereunto the lifts of the cloth are hooked, as well as to the immoveable part
 “ above with tenter-hooks set all along a cloth about two inches distance) higher
 “ or lower, there being pins and holes to fasten the said lower chap any where.

" Now this work is done in a warm sun-shiney day, that by the heat and time of
 " the cloth's detention in the tenters, the desired ends above-mentioned, and of
 " fixing the cloth to its dimensions, may be obtained. Where note also, that
 " while the cloth is thus in the tenters, they lay the wool of it all one way, by
 " running it over several times with short bristled buthes fixed under the palms of
 " their hands.

40. " Having taken it out of the tenters, they rough it, that is, raise the wool
 " of it, or make all the little hairs beaten up in the milling to stand an end, so as
 " the extravagancies and inequalities of them may be corrected by the succeeding
 " sheers. And this they do by doubling the cloth over a perch, placed horizon-
 " tally over the head of the workman; and then placing their hand on one side of
 " the cloth, and their handle on the other, they do (moving hand and handle to-
 " gether, from the top to the bottom of the workman's reach) scratch up the
 " woolly exfilaments of the cloth, as aforesaid. Now the handle, last above-men-
 " tioned, is an instrument made of above twenty teazils (or burs of labrum vene-
 " ris, each of which carries a thousand hamuli) bound into a frame of willow-
 " wood with a double twine thread, and is cleared from the flocks, which it ga-
 " thers, with another instrument called a preem, which is nothing but about forty
 " long wire-needles, crooked and set into an handsome frame of wood.

41. " The wool being thus universally raised and set on ends, the next, even-
 " that great and subtil work of sheering follows, unto which the description of the
 " sheers, with their weights, bolsters, querrets, hooks and collars, as also of the
 " sheering-board, is necessary, or at least convenient.

" These sheers have this common with all other sheers and scissars, that they
 " have two edges decussating each other, which edges are not in the same but in
 " several plains, and the point of decussation changing or running from end to end
 " of the edges in a moment, or in a very small space of time.

" They have another thing in common with some other sheers, which is, that
 " their edges close with the strength of the sheer-man's hand, but open by the
 " springiness of the circular bow, which joins both edges or chaps of the sheers
 " together.

" They differ from most sheers and scissars, that the two chaps are not joined to-
 " each other in their decussation with a central pin on which they turn, the chaps
 " in such being both opened and shut by the strength of the workman's hand.

" Lastly, they differ from all other sheers, in that one of the chaps, viz. the
 " lower, is moved by one single progressive motion along the working-board, the
 " other moving also with the same, but making numerous alternate resiliencies to
 " and from the said under chap in its way; the whole sheer is moved forwards, as
 " aforesaid, with the right hand and left thigh of the workman, whilst the upper
 " chap plays upon the lower in the alternate resiliencies aforementioned, by the
 " strength of the left-hand wrist and the vola of the right. Now the said left-
 " hand

“ hand wrift moves upon the fingers of the fame hand as upon a center, the fame palm
 “ grasping and moving the querret, which moves also upon the outward side or back
 “ of the sheer’s upper chap, as on its center : where note, that the lower chap is kept
 “ close down to the sheering-board with weights of lead ; and the upper chap is
 “ made to prefs more or less closely upon the lower (whereby to cut a deeper or shall-
 “ lower kerse) with the help of cushions or bolsters made of folded cards, thrust under
 “ the wooden-stock, whereunto the wrift-collar, above-mentioned, is fastened.
 “ So that, if the weights be multiplied upon the lower chap, and the cushions be but
 “ thin, then the sheer works rank, that is, takes off a deep flock ; the contrary, if
 “ one or both these causes be removed.

42. “ The curiosity of making these sheers lies in the bow and in the twist of
 “ the shank, to make the upper chap strike true upon the lower ; as also in grind-
 “ ing the edges into very strait lines ; and, to be short, in so fitting the chaps one
 “ to another, as no light may be seen between the edges, though held up before it.
 “ Which work is so subtle, that a small touch of a hammer, struck in one place,
 “ makes the chaps close duely, perhaps seven or eight inches off. Moreover, so
 “ few men can set and grind a sheer exactly (and yet it is done so easily by him, who
 “ hath the sight) that one man at appointed times perambulates a whole county for
 “ this purpose.

“ To conclude this matter of sheering, I say, that the art of driving the sheer
 “ (whereby the nap of the finest cloth is cut so short, close, and even in all places)
 “ is so nice, that the sight itself cannot scarce apprehend it, much less can words
 “ describe it ; for it is only the touch of the workman’s hand, that can under-
 “ stand it.

“ The cloth in its sheering is successively drawn over that, which they call a board,
 “ which indeed is rather a cushion (whose back is a board) stuffed very hard and
 “ even with wool, the belly being made of fine sack-cloth, and covered again with
 “ woollen-cloth. The desiderata of the board are, to be even, evenly convex, and
 “ to have a gentle cession and resiliency in it.

43. “ They use also a kind of an ointment upon the cloth and upon the edges
 “ of the sheers, before they cut, which serves (as I suppose) to facilitate the sheers
 “ sliding over the cloth, and to soften the nap of the wool, so as it may be shorn
 “ off more easily ; as barbers use soap and warm water for the more easy shaving
 “ of the beard.

“ After the cloth is once shorn, it is roughed again, and shorn again, even to
 “ the third time, or until the whole ground be fully raised, that is, until the nap be
 “ as thick as it may be, and then shorn down to all possible politeness.

44. “ When the cloth is thus shorn on one side, it is for the most part cottoned
 “ on the other side, which they call the wrong side ; but frizes are cottoned on the
 “ right side, for cottoning makes them such. Now cottoning is the same as the
 “ nap of the wool, which consists of innumerable extant villi or pili, as if one
 “ should

" should take the tops of five hundred stalks of corn in a standing corn field, and
 " tie them together; afterwards twisting them round, until they become fast with-
 " out tying, and so proceed throughout the whole field, turning all the said field
 " into little cones.

" Now the ingenuity of cottoning is, how, with a few twirls of the hand, suddenly
 " to raise a thousand of these little cones out of the nap of the cloth, and so to
 " change the whole face and appearance of it, and in some measure the colour itself:
 " For every cone casting a shadow makes the superficies of the cloth appear
 " more blackish and sad than before. Where, by the way, I offer, whether galls
 " (supposing all astringents work by twisting and curling, as before I shewed) do
 " not twist the aculeate particles of dissolved copperas, making of themselves no
 " colour, into numerous cones, and thereby produce a black colour; the pro-
 " priety of cones, and pyramids, and other acuminate bodies, being to return
 " none of the light they receive, which is the same, as to cause inconspicuity or
 " blackness.

45. " Now the sudden making these cones out of the nap of a cloth is as fol-
 " loweth: They take a thin board, about sixteen inches long and twelve broad,
 " and incrustate one side of it to the thickness of an half crown with a composition
 " of sand, rosin, and wax; to the other side of this board they fasten two handles
 " perpendicularly.

" The cloth to be cottoned is made a little clammy, with an ointment made
 " with honey, and rosin, and strong wort. The cloth and tool being thus pre-
 " pared, they set the above-mentioned cottoning-board on the cloth, and then
 " move it like a sieve you clean corn with. By this motion and affrication, the
 " crustamentum of the board becomes warm and adhesive, whereby it catches
 " hold of the villi of the nap, being made clammy as aforesaid; and by its
 " twirling motion twists them into cones.

" Cloth being thus dressed, is folded up after a peculiar manner into leaves,
 " between each of which skins of hard vellum being laid, it is put into a screw-
 " press, where, by remaining some time, it gets a gloss."

The amanuensis was ordered to provide serpents, that will burn under water,
 against the next meeting.

Sir WILLIAM PETTY read his propositions concerning shipping.

An experiment being made to turn water into air in a bladder, the bladder
 failed, because the water was too hot.

Dr. GODDARD brought in an additional account of the stone called *Oculus mun-
 di*; which was ordered to be registered, together with that given in on the 13th
 of November.

VOL. I.

K

A copy

A copy of Dr. WREN's hypothesis of Saturn was directed to be made, in order to be sent to Monf. HUYGENS.

Decemb. 4. Sir ROBERT MORAY was desired to bring in his engine for hearing, at the next meeting.

Sir WILLIAM PETTY promised to speak with the lord viscount Brouncker, concerning his account of shipping, and to communicate an account of it to the next meeting.

Dr. GODDARD tried a transparent stone, as the *Oculus mundi*; but no considerable alteration was made in it, when steeped in water.

Mr. ELLISE subscribed his name.

Mr. LONG, Mr. HOSKYNs, Mr. HAAK, Mr. WILLUGHBY, and Mr. Le FEBURE, were admitted into the society.

JOHN BROOKE, esq; was proposed as a candidate by Sir WILLIAM PETTY and Mr. BALLE.

Mr. POWLE promised to bring in an account of iron, from the ore to the bar.

Mr. CROUNE was desired to inquire into the manufacture of hats.

Mr. ELLISE promised to inquire into the making of lead.

The amanuensis was ordered to bring in a glass-hatband at the next meeting.

Mr. ELLISE and Mr. POWLE were requested to try the quicksilver experiment in the deepest pit, which they can meet with :

Mr. ELLISE to try likewise, whether the weight of any thing differs at the bottom of a pit, from what it does at the top :

Mr. BOYLE to bring in his observations of the quicksilver experiment : And

Mr. BALLE to communicate his account of the same.

Mr. CROUNE read a Latin letter from Monf. De MONTMORT, president of the academy at Paris, to Sir ROBERT MORAY.

The amanuensis produced artificial serpents, which being fired, and cast into the water, burnt there till they bounced.

Decemb. 11. Mr. POWLE promised to communicate a description of the place mentioned by him, as having a remarkable echo.

Dr.

Dr. GODDARD was desired to continue the experiment of steeping the stones in water.

Mr. LE FEBURE, Mr. HAAK, and Mr. HOSKYNs, subscribed their names.

Sir ROBERT PASTON, bart. was proposed as a candidate by Dr. HENSHAW.

The Muscovia powder, formerly brought in by Mr. PALMER, was mentioned to be called Playon.

Upon a report made, that Mr. EVELYN, one of the members of the society, had done honour to it, in an excellent *Panegyric on his majesty King CHARLES II. at his coronation*¹; and since that, in an Epistle Dedicatory, addressed to the lord chancellor; in which, with great eloquence, and high expressions of esteem, he mentioned the society and its design, and most affectionately recommended it to his majesty and his lordship; the society were so sensible of the great favour done them by this worthy person, that they ordered their thanks to be given him; and in order to make these thanks the more solemn, appointed them to be entered into their journal-book.

Decemb. 18. Dr. WILKINS was desired to produce, as soon as his conveniency would permit him, his experiment of hearing, which he promised: And

Mr. BOYLE to try the velocity of sounds.

Dr. SETH WARD, lord bishop of Exeter, subscribed his name.

Sir ROBERT PASTON was admitted into the society.

JOHN WINTHROP, esq; was proposed as a candidate by Mr. BRERETON.

A bolt-head, with a long and small neck, being filled to eight inches higher than the boul, and then nipt up and put into a skellet of water a little warmed, the water in the neck of the bolt-head ascended ten inches, and left thirteen with compressed air above; but it was not tried farther, lest the glafs should burst.

Dr. CLARKE was desired to bring in his account of his late dissection of a dog.

It was ordered, that the society's meeting be adjourned to that day fortnight, on account of the festival of Christmas; and that the experiment of hearing be provided for that meeting.

Mr. BALLE brought in his account of the quicksilver experiment made at Main-head; which was ordered to be registered¹.

¹ Published at London in April, 1661. in folio.

¹ Register-book, vol. i. p. 134.

1664. *January 1.* Mr. COLWALL introduced to the society a captain of an East-India ship, who offered to observe such inquiries, as they should propose to him.

Mr. CROUNE was desired to write to Dr. POWER, to observe the weather at Halifax:

Dr. WREN to draw up a scheme for a weather-cock, against the next meeting: And

Mr. POWLE to observe the weather at home, and to give account thereof at his conveniency.

Four or five copies of the inquiries for foreign parts were ordered to be made and given to Mr. POVEY.

Mr. OLDENBURG read a paper concerning a new manner of cutting the stone out of a man's bladder.

Mr. ROBERT PASTON subscribed his name.

Mr. WINTHROP was admitted into the society.

Dr. WREN was requested to prosecute his design of trying, by several round pasteboards, their velocity in falling.

Dr. WILKINS produced his engine for hearing.

Mr. LE FEBURE shewed the society a piece of mineral sulphur, as clear and white as crystal.

Jan. 8. Sir ROBERT MORAY communicated letters, in French, from Monf. FRENICLE to Monf. HUYGENS, concerning the hypothesis of Saturn; which were ordered to be translated into English.

Mr. ROOKE read a paper of inquiries to be made in the East-India captain's voyage to Bantam.

The method of founding the depth of the sea was discoursed of.

Dr. WREN brought in a scheme of a weather-clock.

It was ordered, that all the papers of inquiries for foreign parts be written out into one paper.

Mr. HENSHAW read a paper of proposals for freezing of wine in a glass-globe with a short neck.

Mr. BROOKE was admitted into the society.

Mr. EVELYN read an *Account of the making of marbled paper*; which was ordered to be registered^a.

Jan. 15. Two copies of the inquiries for the East-Indies were ordered to be made against the next meeting.

Dr. WREN, Mr. BALLE, and Mr. ROOKE, were desired to consider those observations, that were sent by the earl of SANDWICH.

Prince RUPERT sent the society a description, in High Dutch, of the method of making good gun-powder; which Mr. OLDENBURG was desired to translate, and Sir ROBERT MORAY to return their thanks to his highness.

Mr. CROUNE read an account of the weight of a live carp, in and out of the water; and of its weight when dead; which account was ordered to be registered^a, and is as follows:

“ The weight of the carp alive in the air was 2 lb 1 3.

“ The fish tied to one end of the scale-beam was so light in water, that the scale at the other end raised her: therefore was fastened to her a weight of 8 3; the whole weighed 7 3/4 3/4 3/4. The weight of the 3/4 lb in water *per se* 7 3. So the carp weighed alive in water 3/4 3/4 3/4; and lost of its weight in the air 1 lb 15 3/4 3/4. But the 8 lb weight lost of its weight in air but 1 3.

“ The carp was opened to take out the swim; but before it was taken out, she was laid in the water on her side (the belly open, and the spawn, &c. in) which posture she kept, and remained on the surface of the water.

“ Then the swim, spawn, &c. being taken out, she was again put into water; the belly folded up close, she swam; till beginning to move, the belly took in water, and sunk her to the bottom.

“ The swim bore up a weight (weighed in water) of 2 3/4 1 3. The fish dead, without spawn, &c. weighed in air 6 3/4 5 3/4 2 3. Dead (as before) in water 2 3/4 1 3.

“ The swim tied to it bore it up.

“ The heart taken out and cut into many pieces, every piece contracted and dilated itself almost 1/4 of an hour.

“ After all, that is above mentioned, was done about an hour, the fish being touched under the gills, gave a strong leap up.

^a Register-book, vol. i. p. 137.

^b Ibid. p. 241.

About

"About two hours after, she had a strong tremulous motion of the gills and mouth.

"The bladders and the swim are perforated into each other.

In a roach,

"Almost the same things were observed; it weighed, in air, $7\frac{3}{4}$ 73 19; in water, 13 29: the swim bore up, 53.

"A 9 weight of brads laid on the dead roach sunk him to the bottom; half a 9 would not do it. Quær. Whether this be not to be allowed to the air in the pores, blood, cavities of the ventricle, &c."

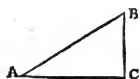
January 22. The experiment of making marbled paper was made by a man introduced by the amanuensis; which succeeded, according to Mr. EVELYN's description of that method.

Sir WILLIAM PERSALL entertained the society with some magnetical experiments.

The pendulum experiment was discoursed of by the lord viscount BROWNECKER, who brought in the account and schemes of it; and a committee was appointed for making trials of it, consisting of his lordship himself, Mr. BOYLE, Sir WILLIAM PETTY, Dr. WILKINS, and Dr. WREN.

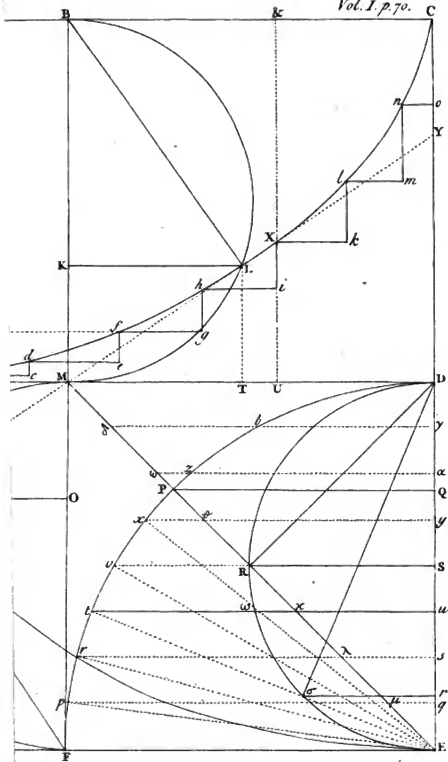
His lordship's paper was ordered to be registered*, and a copy of it made against the Friday following, and brought to Sir ROBERT MORAY, to be sent to Monf. HUYGENS. The paper was as follows:

"Imagine the curve HXC to be made up of an infinite number of equal sides or strait lines (as Hb, bd, df, &c.) so inclining, that their perpendicular altitudes (ab, ed, ef, &c.) are in an arithmetical progression from an horizontal to a vertical position. I say, first, a bullet moving in such a curve, falls from all parts thereof in equal time, as from f to H, b to H, d to H, X to H, &c. all in the same time; which I shall demonstrate presently. But first I must ask, that it be granted me, that the increase of the velocity of the same body descending is always in proportion to the power of the weight. As, that because the powers of the weight are in proportion to the perpendicular altitudes of the inclinations of the planes, as you may see in STEVINUS, *Livre I.*

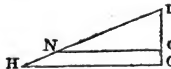


"*de la Statique*, prop. xix. cor. 2.
"therefore, AB and DE being
"of the same length, and EF to
"BC as 1 to a, the increase of
"the velocity of a bullet in descending BA is to the increase

* Register-book, vol. i. p. 157.

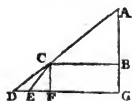


" of the velocity of the same bullet in descending ED as a to 1; and consequent-
 " ly, that the time it descends ED, is to the time it descends BA, as \sqrt{a} to 1.



" For if the increase of the
 " velocity upon BA be to
 " the increase of the velocity
 " ED, as a to 1, or as GH
 " to KL (IG and MK be-
 " ing equal, as representing
 " the same space of time;) then drawing NO parallel to the base, so as the
 " triangle NOI be equal to the triangle LKM, that the triangle LKM re-
 " presenting the side DE, NOI may represent the side AB; and therefore,
 " the time of the bullet's descent upon AB, to the time of its descent upon DE,
 " as IO to IG; but because HG is to LK, as a to 1; therefore the triangle
 " HGI is to the triangle NOI (= LKM, as a to 1. And because the tri-
 " angle HGI is to the triangle NOI, as the square of the side GI to the
 " square of the side OI; therefore the square of GI is to the square of OI, as
 " a to 1. Therefore GI is to OI, as \sqrt{a} to 1, or as $1 : \frac{1}{\sqrt{a}}$.

" Now because XI is to ba , as XH is to BH, that is, putting x for the
 " number of the sides, as x to 1, therefore the time of its descent from X to b ,
 " being let fall at X, is to the time of the descent from b to H, being let
 " fall at b , as \sqrt{x} to 1. And because XI . bg :: XH . bH (that is) :: x . $x-1$.



" Therefore ABC representing the space or side X b , and
 " AB the proportionable time the bullet is descending
 " that side, found (as before) to be \sqrt{x} ; let a be put for
 " BG, the time that the said bullet, being let fall at X,
 " is passing from b to f ; and let y be put for BC, the
 " velocity, that the bullet hath acquired at b in its descent
 " from X. Then because AB, CF, BC, FD, that is,
 " \sqrt{x} . a :: y . $ayrx$; therefore $DF = ayrx$; and because Xi . bg :: DF.
 " FE (by the position above mentioned, that the increase of the velocity is in
 " proportion to the power of the weight; or, which is the same thing, to the
 " perpendicular altitude of the inclination of the side) that is, x . $x-1$:: $ayrx$.
 " $\frac{x-1}{x} ayrx$; therefore $\frac{x-1}{x} ayrx = FE$; therefore the triangle CFE = $\frac{x-1}{2x}$
 " $a^2 yrx$, and the parallelogram FCBG = ay , and the triangle CBA = $\frac{y}{2rx}$.
 " But ECBG = CBA, (because $bf = Xb$) therefore $\frac{x-1}{2x} a^2 yrx + ay = \frac{y}{2rx}$.
 " therefore $\frac{x-1}{2x} a^2 y + 2ayrx = y$; therefore $\frac{x-1}{2x} a^2 + 2arx = 1$; therefore
 " $a^2 + \frac{2rx}{x-1} a = \frac{1}{x-1}$; therefore $a = \frac{r:2x-1:-rx}{x-1}$, which therefore is the time,
 " that the bullet, falling from X, descends the side bf . In the same manner,
 " the

" the time the bullet descends the third side, is found to be $\frac{r:3x-3:-r:2x-1}{x-2}$:

" and universally the times are $\frac{r:l+1x-\frac{l^2+l}{2}}{x-l}:-r:l x-\frac{l^2-l}{2}$, l being put for

" the number of sides descended. Now the aggregate of all these times are

" $r:\frac{x^2+x}{2}$; abating this series $\frac{1}{x^2+l} r:\frac{x^2+x}{2}-\frac{l^2+l}{2}$; s being put for 1, 2, 3;

" 4, &c. until it equals x , as is evident by induction: thus,

" If $x=1$, the time is $r\frac{1}{2} - \frac{1^2-1}{2} = r1$.

" If $x=2$, the times are $r\frac{1}{2} + \frac{r3-r2}{1} = r3 - \frac{1}{2}r2$.

" If $x=3$, the times are $r\frac{1}{2} + \frac{r5-r3}{2}$

" $+ \frac{r6-r5}{1} - \frac{1}{2}r5 - \frac{1}{2}r3$.

" If $x=4$, the times are $r\frac{1}{2} + \frac{r7-r4}{3}$

" $+ \frac{r9-r7}{2} + \frac{r10-r9}{1} - \frac{1}{2}r7 - \frac{1}{2}r4$.

" If $x=5$, the times are $r\frac{1}{2} + \frac{r9-r5}{4}$

" $+ \frac{r11-r9}{3} + \frac{r14-r12}{2} + \frac{r15-r14}{1} = r15 - \frac{1}{2}r14 - \frac{1}{2}r12 - \frac{1}{2}r9 - \frac{1}{2}r5$.

" &c.

&c.

&c.

" Then because $\frac{1}{x^2+l} r:\frac{x^2+x}{2}-\frac{l^2+l}{2}$, are the ordinates of an ellipsis, divided

" by a series of triangular numbers, therefore A, B, C representing that ellipsis,

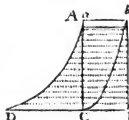
" $ab = \frac{2x+1}{4r2}$

" $AB = \frac{1}{x} r:\frac{x^2+x}{2}$:

" $aA = \frac{1}{x}$.

" $aC = x + \frac{1}{x}$.

" $DC = \frac{x^2+x}{2}$.



and A, C, D the series of triangular numbers; and ACEB a parallelogram upon the same base and altitude with the ellipsis: because the series of ordinates in the parallelogram, divided by the series of triangular numbers respectively, equals twice A B (the series being infinite) or $r:\frac{x^2+x}{2}$.

" For

$$\begin{array}{r} 1)1(1 \quad 1)6(6 \quad 1)10(10 \\ 1)3(3 \quad 3)6(2 \quad 3)10(3\frac{1}{2} \\ 3)3(1 \quad 6)6(1 \quad 6)10(1\frac{1}{2} \\ \quad \quad \quad 9 \quad 10)10(1\frac{1}{6} \end{array}$$

" That is $1)\frac{x^2+x}{2}(\frac{x^2+x}{2}$

$$3)\frac{x^2+x}{2}(\frac{x^2+x}{6}$$

$$6)\frac{x^2+x}{2}(\frac{x^2+x}{12}, \text{ &c. or } l=1, 2, 3, 4, 5, \text{ &c.}$$

$$l^2+l)\frac{x^2+x}{2}(\frac{x^2+x}{l^2+l}$$

usque

" *usque ad*
 $\frac{x^3+x}{2} \cdot \frac{x^3+x}{2} \left(\frac{1}{x} \right)$, being the aggregate.

" But because AB, the dividend, is not $\frac{x^3+x}{2}$, but $\frac{x^3+x}{2}$; therefore the
 " aggregate of all the quotients is not x^3 , but $r \cdot \frac{x^3+x}{2}$ (equal to twice AB) or

" (which is the same, x being infinite) $\frac{x}{x+1} r \cdot \frac{x^3+x}{2}$ for $\frac{x^3+x}{2} \cdot x^3$ ($:: x+1$.
 " $2 \cdot x$.) $:: \frac{x}{x+1} r \cdot \frac{x^3+x}{2} : \frac{x+1}{x} r \cdot \frac{x^3+x}{2}$; and because if from the series of ordinates

" in the ellipsis ACB, there remains the series of ordinates in BCE, the com-
 " plement of the ellipsis; therefore the series of ordinates in BCE, the comple-
 " ment of the ellipsis, divided by the series of triangular numbers ACD re-
 " spectively, is the aggregate of all the times: But this aggregate is still the
 " same, because x is still the same, the number of sides being always infinite.
 " Therefore the bullet descends from all parts of this curve in the same time.

" Next I say, that this curve is a cycloid; for in the triangle MDE, MD and
 " DE being equal to DC, and divided into as many equal parts Eg, gs, su &c.
 " as there are sides in the curve HXC, and the radius of the quadrant DPF,
 " which is also equal therunto, divided in the same manner; the sides of the
 " triangles $Epg, Ers, Etsu$, &c. are proportional to the triangles Hba, bdc ,
 " dfe , &c. and therefore $pg, \mu g$, ($=Eg$.) $:: Ha. ab$. and $rs, \lambda s$ ($=Es$)
 " $:: bc. cd$. and so of the rest; and therefore $HI = ab + cd + ef$. If $= Ha$
 " $+ bc + de :: \mu g + \lambda s + \mu u. pg + rs + tsu$. that is, their number being in-
 " finite, HI , the intercepted diameter, is to If , the ordinate, as the respective
 " triangle $E\mu u$, to the respective proportion $FtuE$; and therefore $AH. HI ::$
 " the triangle EMD . the triangle $E\mu u$; but the triangle EMD . the triangle
 " $E\mu u :: ED \times ED. Eu \times Eu$. And $Eu \times Eu = ED \times E\tau$. ($ED. Eu$.
 " $E\tau ::$ as will presently appear); therefore $EMD. E\mu u :: ED \times ED. ED$
 " $\times E\tau :: ED. E\tau$; therefore $AH. HI :: ED. E\tau$; but $AH = ED$; there-
 " fore $HI = E\tau$. and Eu , the side of the respective triangle, is the mean pro-
 " portional between AH and HI . Now because Eu is the mean proportional
 " between ED and $E\tau$; therefore $E\tau \times \frac{1}{2} ED$ equals the triangle $E\mu u$. And
 " now because DRE is a semicircle, therefore $D\sigma E$ a rectangle triangle. And
 " because DEt is an angle common to both triangles ($D\sigma E$ and tEu) and the
 " hypothenuse of both are equal ($tE = ED$) therefore $D\sigma = tu$, and $E\sigma = Eu$.
 " therefore $FD. E\sigma (=Eu)$. $E\tau$ are in continual proportion (as was said
 " before) and the two rectangle triangles $D\sigma E$ and tEu are equal; but the
 " the triangle $D\sigma E = \sigma\tau \times \frac{1}{2} ED$; therefore the triangle $tEu = \sigma\tau \times \frac{1}{2} ED$.
 " And because $tF =$ the arch σE . therefore $tF \times \frac{1}{2} ED =$ the arch $\sigma E \times \frac{1}{2} ED$.
 " But tF equals the sector tEF ; therefore the sector $tEF =$ to the arch σE
 " $\times \frac{1}{2} ED$; therefore the portion $Eftu$ ($=$ the sector tEF + the triangle tEu)
 " $=$ the arch $\sigma E \times \frac{1}{2} ED + \sigma\tau \times \frac{1}{2} ED$. Therefore the triangle $E\mu u$ is to
 " the portion $Eftu$, as $E\tau \times \frac{1}{2} ED$ is to $\sigma E \times \frac{1}{2} ED$, is to $\sigma E \times \frac{1}{2} ED \times$
 " $\sigma\tau \times \frac{1}{2} ED :: E\tau. \sigma E + \sigma\tau$. but $E\tau = HI$ the intercepted diameter; there-
 " fore
 " Vol. I. L

“ fore $\tau\tau + \sigma E$ is the ordinate; therefore this curve is a cycloid: But if the cheeks
 “ of a pendulum be a cycloid of the altitude of half the pendulum, the bullet
 “ (I say) vibrates in a cycloid: For Xb being infinitely small, that is, but a
 “ point, Xb , continued, that is XM is the tangent to that point, that is, to the
 “ point X ; (and because XV is to XM , as Xi to Xb ; and Xi is to Xb , as
 “ the side of the respective triangle is to the diameter; and the side of the re-
 “ spective triangle is to the diameter, as the intercepted diameter is to the side
 “ of the respective triangle; that is, as XV to the mean proportional between
 “ the diameter and it; therefore XM is the mean, that is, XM is the mean
 “ proportional between AH or $\& V$ and XV); and because the aggregate of
 “ all the terms $ab, cd, ef, \&c.$ *usque ad i X*, equals XV ; therefore so many
 “ times $Xi =$ twice XV ; and therefore as many times Xb (that is, the
 “ curve HX) = twice XM . (And therefore if the diameter be divided accord-
 “ ing to the odd numbers, 1, 3, 5, 7, $\&c.$ and ordinates drawn through these
 “ points, the cycloid HXC is divided by those ordinates into equal parts).
 “ Therefore, LM being a tangent to the cycloid at the point L , $MN = LM$.
 “ therefore the point N is in the semicircle $MNF = MLB$; and because the
 “ angle HMN is equal to the angle VMX , which is the complement of the
 “ angle LMC , and $HM = AB$ the complement of $BC = MD$, therefore MN
 “ cuts the semicircle at the intersection thereof with the cycloid: Therefore N
 “ is in the cycloid HNE . *Quod, &c.*”

Mr. ROOKE'S *Directions for seamen bound for far voyages* was ordered to be re-
 gistered^a, and a copy of them to be brought to Sir ROBERT MORAY as soon as
 possible, and the original to be delivered to Mr. COLWALL.

Dr. WREN shewed his experiment of filling a vessel with water, which emptied
 itself when filled at a certain height.

Mr. BROOKE subscribed his name.

January 29. The lord viscount Brouncker brought in a paper, propounding;
 a way of common measure; of which several copies were ordered to be made.

His lordship also delivered in his account of *The recoiling of guns*; which was
 ordered to be registered^a, and was afterwards printed by Dr. SPRAT^c.

Sir WILLIAM PETTY promised to communicate to the next meeting his obser-
 vations on the vibration of pendulums as a measure.

Dr. GODDARD related, that he had filled a glass-globe with water, and put it
 into a skellet of water on the fire; and by boiling, the globe evacuated itself a
 third part; and being let cool, filled itself again.

Dr. WREN read a paper concerning weather-glasses.

^a Vol. i. p. 149. They are printed in Philof. Transact. n° 8. p. 141. Jan. 1665;
 register-book, vol. i. p. 143. ^c Hist. of Roy. Soc. p. 233.

The Genoese ambassador gave the society a visit, and was entertained with the sight of Mr. BOYLE's air-pump.

JOSEPH WILLIAMSON, esq, was proposed as a candidate by Mr. POVEY.

February 5. Mr. THOMAS STREET presented the society with his *Astronomia Carolina*, printed at London in 1661, in 4to, for which he received their thanks.

Dr. WHISTLER brought in a book, intituled, *Natural and Political Observations upon the Bills of Mortality*, by JOHN GRAUNT, citizen of London, printed at London in 1662, in 4to; and the doctor read the epistle-dedicatory, addressed to Sir ROBERT MORAY, the president, by the author, who sent fifty copies of the book to be distributed among the members of the society; for which thanks were ordered to be returned to him, and he was proposed as a candidate.

Mr. WILLIAMSON was admitted into the society.

Sir GEORGE LANE was proposed as a candidate by Sir WILLIAM PETTY.

HENRY PROBY, esq, formerly proposed by Dr. WILKINS, was now admitted into the society.

Sir WILLIAM PETTY, Dr. BAYNES, Mr. BROOKER, Mr. ROOKE, the lord viscount Brouncker, and Mr. BALLE, were appointed a committee, to examine a paper concerning music, read by Mr. BROOKE.

Dr. WREN was desired to think of an easy way for an universal measure, different from that of a pendulum:

Dr. HENSHAW to bring in writing to the next meeting an account of his experiment of water forced out of a glass by boiling, and returning into the glass after the external water, in which it was set, was cooled: And

Sir ROBERT PASTON to communicate an account of plaister of Paris, and bronze.

It was ordered, that the amanuensis provide against the next meeting a frame for the quicksilver experiment of Mr. BALLE: And

To make a copy of the form of the obligation, to which every member at his admission subscribed: and either himself, or the operator, to attend the members now in arrears at their respective houses, in order to shew them the said copy, and to desire them to pay their arrears due by virtue of that obligation.

* Dr. SERRAT, Hist. of Roy. Soc. p. 67, mentions, that Mr. GRAUNT was, tho' a shop keeper of London, recommended by the king himself to

the society; and that his majesty gave this particular charge to them, that if they found any more such tradesmen, they should admit them.

February 12. Mr. HILL was desired to procure from his brother KIRCHER's secret way of music': And

Dr. GODDARD to bring in an account of his experiment of a glass filled with cold water, and then put into other water in a skellet or other vessel, and heated, &c.

The amanuensis was ordered to provide a leaden pipe of thirty-three feet long, and a glass pipe as long as could be procured.

Dr. WREN proposed black lead as a better means than oil for preserving the pivots of the wheels of watches or clocks from grating or wearing out.

Mr. PALMER suggested bell-metal to be better than any other on account of its hardness, for the pivots of wheels to run in.

Dr. WREN proposed to try a watch in Mr. BOYLE's engine.

A committee consisting of Sir WILLIAM PETTY, Dr. NEEDHAM, Dr. WILKINS, Dr. GODDARD, Dr. ENT, and Dr. WHISTLER, was appointed to examine Mr. GRAUNT's observations on the bills of mortality.

Mr. PROBY subscribed his name.

Mr. WINTHROP promised to deliver in an account of strange tides at the next meeting.

Sir ROBERT MORAY brought in a paper of inquiries into the cause of the fulmination of gold, written by Dr. CHARLTON, which was read.

February 19. The amanuensis was directed to provide against the next meeting the leaden pipe and the glass one, for which he had received orders before.

ALEXANDER STANHOPE, esq; was proposed as a candidate by the lord viscount Brouncker.

Sir GEORGE LANE was admitted into the society.

Mr. WILLIAMSON subscribed his name.

The vegetation of plants was discoursed of.

¹ Probably that jesuit's *Musurgia universalis*; *five arsi magna consoni & dissoni, in decem libros digesta*; quâ *universa fœnerum doctrina & philosophia, musiceque tam theoretica quam practica scientia traditur.* Rome 1650, two vol. fol.

Dr. HENSHAW was desired to try the experiment of the increase of weight in a tree: And

Dr. WILKINS to make a trial of mint growing in a vial with water.

February 26. Mr. BALLE was requested to speak with Sir WILLIAM PERSALL about his experiments of the loadstone.

Mr. STANHOPE, Mr. GRAUNT, and Dr. POWER were elected into the society.

Dr. POWER sent to the society a paper concerning some experiments of his relating to the rise of water in small tubes.

Trades were discoursed of.

Sir WILLIAM PETTY promised to produce on that day fortnight his paper concerning trades.

The purging of gold with antimony was another subject of discourse.

Dr. GODDARD, Dr. WHISTLER, Dr. CLARKE, and Mr. CROUNE were desired to make the dissections of rabbits; and that each of them would do it singly.

March 5. Mr. GRAUNT and Mr. STANHOPE subscribed their names.

The amanuensis was ordered to attend Dr. WREN, to take directions concerning the experiment of the water in the long tube.

Sir ROBERT MORAY read some letters* from Monsieur HUYGENS, concerning some experiments made by him with Mr. BOYLE's engine, as he had altered it.

Mr. ROOKE and Mr. CROUNE were desired to try the experiment mentioned by Monsieur HUYGENS of a feather to be let fall before and after the exsuction of the air in the said engine: And

Sir WILLIAM to make some trial with the needles and load-stone at the next meeting.

The account of the refining of gold was ordered to be brought in at the next meeting by Dr. GODDARD, Dr. WHISTLER, and Mr. WINTHROP.

March 12. Mr. BOYLE shewed a composition called *Rufma*, which being put upon an hairy arm, took off the hair without pain in a very short time, as two or three minutes.

Sir WILLIAM PERSALL made some experiments of the load-stone, and was desired to bring an account of them in writing.

* Letter-book, vol. i. p. 26. 28. and 63.

It was ordered, that the amanuensis make three copies of the equation of days, sent by Monsieur HUYGENS to Sir ROBERT MORAY, and translate them as soon as possible:

That the operator go to Radcliffe for the glafs tubes, made by Mr. GOURNEY for the long leaden tube: And

That he make the founding instrument ready against the Friday following, at two in the afternoon.

March 19. Mr. BOYLE shewed a glafs vial, which was corroded with a liquor at the top, and had an hole made by it at the bottom.

Dr. CHARLTON read the epistle of a book of problems, dedicated to the king by Mr. HOBBS*.

The lord viscount BROUNCKER gave an account of the sinking of a wooden ball in the water; and was desired with Mr. BOYLE to go to the sea, and try the experiment there.

It was ordered, that the amanuensis cause the wooden balls, which are to plumb the depth of the sea, to be blacked over with oily colours: And

That the operator go the next morning to the p'umber, and order him to erect the leaden pipe at Gresham College; and to go the day following to Radcliffe for the glafs-tube.

Mr. BOYLE was desired to prosecute his experiment of sounds.

Mr. EVELYN brought in a paper containing an account of three pots with earth in them, wherein he had sowed three several sorts of seeds for the farther trial of the increase and weight.

1662. March 26. Sir ROBERT MORAY read the following account of *An experiment of the instrument for sounding of depths without a line or cord, made the 19th of March 1662*, by the lord viscount BROUNCKER and himself; which was ordered to be registered†, and a copy of it to be sent to the Trinity-house.

“ The globe was of maple-wood, $5\frac{1}{2}$ inches in diameter, weighing $2\frac{1}{2}$ lb. having in it a hook of iron for bearing of the lead.

“ The lead of a conical figure, 11 inches long, $1\frac{3}{8}$ inch at the top, and $\frac{3}{8}$ inch at bottom in diameter, with a wire at top making an angle of some 60 degrees
“ with the side of the lead, which weighed $4\frac{1}{2}$ lb.

* *Problemata physica*, printed at London in 1662, in 4to. Transactiōns, vol. ii. n^o 24. p. 439, for April 1667.

† Vol. i. p. 133. See Philo'sophical

“ the

" The depth of the water being about 19 foot ; between the immersion of the globe and emerſion thereof there intervened upon reiterated trials ſtill 6 ſeconds of an hour, meaſured by a ſecond watch.

" At the depth of about 10 foot there intervened conſtantly $3\frac{1}{2}$ ſeconds, or thereabouts.

" They found no difference in time of the ſubmerſions of the globe at the greateſt depth, when it roſe ſome two wherries lengths from the place where it was let fall (being carried by the current of the tide) and when it roſe within a yard or ſo of the ſame place where it was let fall.

" The wooden globe did always riſe quite above the ſuperſice of the water, when it was let fall at the greateſt depth.

" The globe being put into the water without the weight, the ſuperſice of the water covered it to about $\frac{2}{3}$ of the diameter."

Mr. ROOKE read his *Direction for the obſervations of the eclipses of the moon*, which was ordered to be regiſtered⁷, and two copies of it to be made.

Dr. GODDARD was deſired to bring in an account of the purgation of gold by antimony ; and another of the experiment of water in the long leaden tube.

The amanuenſis was ordered to go to Radcliffe, and beſpeak large receivers of glaſs as thick as poſſible, with an hole in the bottom capable of receiving a man's arm : And

That he make cement for Mr. ROOKE, according to Monsieur HUYGENS's directions.

Sir PETER WYCHE was propoſed as a candidate by Mr. COLWALL.

April 2. Dr. GODDARD was deſired to proſecute the experiment of the long tube.

Sir PETER WYCHE was admitted into the ſociety.

Sir HENRY DE VIC was propoſed as a candidate by Sir ROBERT MORAY.

The amanuenſis was ordered to write out the *Inquiries for foreign parts*, and to deliver them to Mr. BOYLE ; and it was directed, that among theſe inquiries be inſerted one, whether the rain-water varies in weight, trial thereof being made in divers places.

⁷ Register-book, vol. i. p. 154. It is printed in the *Philosophical Transactions*, n^o 22, p. 388, Feb. 1666, and in the *History of the Royal Society*, p. 180.

Sir ROBERT MORAY shewed leaves of gold-beaters made of ox-guts, brought from Holland; upon which it was ordered, that the amanuensis procure some of those, which were made in England.

It was resolved, that every member of the society shall consider against the next meeting of some experiment, which he will undertake himself.

April 9. Dr. GODDARD read an account of his trials with several liquors in the long leaden tube, and was desired to try farther the experiments with oil and milk.

Dr. WILKINS brought in three Latin certificates concerning the report of the voiding of seeds by one ANNA VOS; which were publicly read by Mr. ROOKE, and ordered to be filed.

Dr. CLARKE related his injecting of a medicine made of an infusion of agaric and fenha into a dog's leg, which killed the dog.

ROBERT SOUTHWELL, esq; was proposed as a candidate by Mr. BOYLE.

April 16. Mr. ROOKE read a paper concerning music, brought in by Mr. BROOKE.

April 23. Mr. BOYLE brought in a glass tube, bent as in the margin, (the short end of which was sealed up) containing water for compressing the air.

Mr. WINTHROP shewed a tin lamp, called a bladder's lamp, burning high like a candle, continually feeding itself; of which a diagram was ordered to be made and registered.

He also produced malleable mineral lead, and a piece of a rock of Granite.

Mr. ROOKE read his account of oil put in the long tube; and it was ordered to be kept, till it should be completed.

The amanuensis was directed to take care to procure the long glass-tube, which Mr. COLNEY promised to make.

Mr. BOYLE gave an account of his weighing of air, and was requested to prosecute his experiment.

Sir ROBERT MORAY read his proposition for experiments to be made under ground in deep pits.

Dr. WILKINS read the following letter from Dr. POWER to Mr. CROUNE concerning some magnetical experiments; which was ordered to be entered into the letter-book:

* Vol. i. p. 31.

" HONOUR'D

" HONOURED SIR,

" My last, I hope, you have received. I have been since tampering with the
 " load-stone, and I think have happily lighted of another experiment, which will
 " advance the hypothesis I formerly delivered unto you, *viz.* that the effluvijs
 " of all magnetics do not proceed *ab intrinseco*, but are channelled through magne-
 " tic bodies, as light through a burning-glass. Take the experiment (which I
 " would have you annex to my former) here as followeth :

" *Experimentum magneticum novum.*

" Take a rod of iron for a puncheon ; heat it red-hot, and according to the
 " laws of its refrigeration you may endue this or that extreme with what polarity
 " you please now : afterwards by striking it with a hammer in the same posture
 " as it was cooled, you may much advance and invigorate its magnetic virtue, as we
 " have formerly declared to you. But now the main observable of all is, that af-
 " ter both the reception of the virtue aforesaid by convenient refrigeration, as also
 " the augmentation of it by percussion, you may, by inverting and repercutting
 " the extremes, alter the polarity of the iron at your pleasure : and farther (which
 " is as strange) if you strongly strike the iron in the middle betwixt the two ex-
 " tremes, it will destroy all magnetism formerly acquired.

" Which experiment does not only evince the magnetical fluors to proceed *ab*
 " *extra*, and to enter the body of iron, according to the line and direction of the
 " percussions ; but also may be a leading experiment to farther discoveries.

" What farther advances we shall make of it here, your honourable society shall
 " not fail to know. But indeed I want the noble assistance of such ingeniosos, as
 " you daily enjoy, both to encourage and farther such endeavours.

" Be pleased, I pray you, to let me have a few lines from you of Dr. WREN's
 " instrument, and an answer to what other particulars of my last letter you think
 " fitting. At present excuse the scribbling haste of,

Hallifax this 24th
 of March, 1661.

S I R,

Your most affectionate Servant,

HENRY POWER."

Dr. BAYNES was desired to take upon him in his travels, to inquire about such things, as the society will direct him to.

Mr. BRERETON, Mr. ROOKE, Mr. BROOKE, Mr. HILL, the lord viscount Brouncker, Sir WILLIAM PETTY, Dr. BAYNES, Mr. BALLE, and Dr. PETT were appointed a committee to examine the synopsis of Mr. BERCHENSHA.

VOL. I.

M

Dr.

Dr. WILKINS was desired to bring in a piece of hanging tinged with several colours.

April 30. Mr. LE FEBURE brought in a mass of *Calx viva* and honey; and also a crystal of saltpetre separated after it had been mixt with sugar and rose-water: as likewise a little of a metallic tincture, which being thrown into water, tinged at first but by reflection; but after the water was stirred, was tinged throughout with a clear purple colour. He was desired to give the receipt of them all three.

Mr. WINTHROP produced a little stone, of which one part was, as it came from the rock, of an amethyst colour, and the other after calcination of a flesh colour.

He brought also a piece of wood called *Lignum colubrinum*, or in Dutch *Schlangen holtz*; the taste of which is bitter.

Sir ROBERT MORAY read his account of the satellites of Jupiter on Friday the 25th of this month.

The operator was ordered to provide against the next meeting two birds, one a chicken and another bird, and a live mouse or two.

Mr. HILL was desired to procure some of the water brought from the East-Indies, to be compared with that of this country.

It was ordered, that two or three carps bladders be provided against the next meeting.

The experiments, agreed on for the next meeting, were the exercise of Mr. BOYLE's engine, and to put a carp's bladder into the long tube.

May 7. Mr. BOYLE's engine was exercised on the arms of several of the members of the society, who found, that the air being pumped out, their arms were drawn into the receiver.

Sir HENRY DE VIC and Mr. SOUTHWELL were admitted into the society.

Mr. BOYLE produced a glass for trying the difference of the strength of corrosive liquors.

Mr. OLDENBURG produced a letter concerning a level of the air.

Mr. BOYLE shewed two transparent liquors, which being mixed together, made a white coagulum.



Sir

Sir WILLIAM PETTY brought in *An apparatus to the history of the common practices of dying*; which was ordered to be registered^a.

It was resolved, that the first thing to be done at the next meeting, be the experiment of dissolving flesh by a liquor of Mr. BOYLE.

May 14. Mr. BOYLE shewed his experiment of dissolving a piece of boiled mutton; which being minced small, and put into an empty vessel, a brown-coloured liquor was poured on it; and immediately waxed so hot, that a person could not bear his hand under the glass; and the meat and liquor became one substance like thick blood.

Mr. EVELYN presented the society with a written book of the history of the rolling-press; which was ordered to be filled up.

Mr. SOUTHWELL subscribed his name.

He produced a great horn, said to be an unicorn's; and shewed also a little one, which grew on a cock's head, being the spur of the fowl cut close till it bled, and set on the head immediately after the comb was taken off (it being squeezed on, and a few ashes strewed thereon to staunch the blood) when the cock was fresh caponed.

Dr. WILKINS produced a piece of tinged hanging.

It was ordered, that no original paper be taken away by any member before it be registered, without the leave of the society.

Mr. HAAK was desired to translate an Italian treatise concerning dying.

The experiment of putting the hand into Mr. BOYLE's engine, was directed to be repeated by Dr. WILKINS: and also an experiment to be made in it with a viper.

The operator was ordered to provide a crop pigeon against the next meeting, to be put into Mr. BOYLE's engine.

Mr. PROBY promised to peruse the statute-books for manufactures.

Dr. WALLIS gave an account of a young man deaf and dumb, who, after three months instruction by him, was brought to speak words very plainly^b. The doctor was desired to bring the young man to the next meeting of the society.

May 21. Dr. WILKINS president.

^a Register-book, vol. i. p. 1. It is printed in Dr. SPAAT's Hist. of the Roy. Soc. p. 284.

^b Dr. WALLIS in a letter to Mr. OLDENBURG, dated at Oxford, December 30, 1661, printed in Mr. BOYLE's works, vol. v. p. 511. gives an ac-

count of this attempt of his: "I am now employed, says he, upon another work, as hard almost as to make Mr. HOBBS understand mathematics. It is to teach a person dumb and deaf to speak, and to understand a language, &c."

Dr. WALLIS brought with him the young man born deaf and dumb, and made him pronounce several words; and was desired to continue his practice upon him.

Sir WILLIAM PETTY, Dr. GODDARD, Mr. ROOKE, Mr. BOYLE, and Dr. WILKINS, were appointed a committee for the examining Mr. TOWOOD's water-works; and any other members, who should think proper, might assist the committee therein.

May 28. Dr. WILKINS president.

Dr. ENT was desired to bring in at the next meeting his box of little animals, which make a noise, called the death-watch.

The operator was ordered to provide little fishes, as small pikes, and to keep them in glass-bottles, shifting the bottles with water every day; and this was directed to be done in Dr. GODDARD's lodgings, that he might take care, that his servant and the operator did not fail in their attendance upon this business.

The bishop of Exeter^b, related the intention of a person of quality to assist the society in their experiments: upon which it was proposed to make a draught of the society's design, in order to be shewn to such as might be benefactors.

Mr. BOYLE shewed the ascent of water in white sand in a glass tube.

Sir WILLIAM PETTY was desired to go with Mr. WEBB, and seek out the best dyers pump; and Mr. OLDENBURG to speak to Mr. TOWOOD to provide himself with a ship and pump, and to give an account when he shall be ready.

June 4. Dr. WILKINS president.

WILLIAM WINDE, esq; was proposed as a candidate by Dr. WILKINS.

Mr. BOYLE produced two of prince RUPERT's draught-pieces in print.

Mr. CROUNE produced two embryos of puppy-dogs, which he had kept eight days, and were put in spirit of wine in a glass-vial sealed hermetically.

Mr. BOYLE promised to make the like experiment in rabbits.

The lord viscount Brouncker was desired to bring to the next meeting his paper of experiments, to be registered.

Dr. WILKINS brought two dead insects, called death-watches, which Dr. ENT had promised to produce.

Dr. GODDARD shewed an human embryo, two inches long.

^b Probably Dr. SETH WARD; for bishop GAUDEN was elected to the see of Worcester May 23, 1662.

It was ordered, that those members, who were desirous to see Mr. TOWOOD'S engine compared with a pump, might meet at the Temple in the church, at ten, on the Saturday following.

The operator was directed to provide as small fishes as he could procure, and to keep them in distilled-rain-water.

Mr. BOYLE related, that letting stand a tube with sand in water for thirty hours, he found, that the water had ascended twenty-four inches. He was desired to prosecute that experiment.

The lord viscount BOUNCKER, Sir ROBERT MORAY, Sir WILLIAM PETTY, Dr. GODDARD, and Dr. WILKINS were appointed a committee to draw up a paper concerning the design of the society.

The amanuensis was ordered to make a fair draught of the information concerning the royal society, and to deliver it to the bishop of Exeter.

Mr. BALLE, Dr. POPE, the lord viscount BOUNCKER, and Sir ROBERT MORAY were desired to try the variation of the needle at Whitehall: And

Mr. CROUNE to inquire about the hanging of a carp.

RALPH CUDWORTH, D.D. and HENRY MORE, D.D. were proposed as candidates by Dr. WILKINS.

JUNE 11. Sir ROBERT MORAY president.

Dr. PETT'S brother shewed a draught of the pleasure-boat, which he intended to make for the king.

The lord BERKLEY, of Berkley Castle, presented the society with a bird of Paradise, having two feet.

Dr. GODDARD shewed a moth with feathered wings.

Mr. EVELYN presented his book, entitled *Sculptura; or, the history and art of Chalcography*, printed this year at London in 8vo.

It was ordered, that Mr. BALLE be desired to produce his magnetical instruments.

Mr. BOYLE presented the society with a book concerning the weight and spring of the air; and also with a glass-tube filled with minium, with which the experiment of filtering was made.

The amanuensis was ordered to inquire about the depth of the water under the arches of London-bridge.

Mr. CROUNE was desired to write to Dr. POWER, about the trial of heat and cold in deep caves.

The amanuensis was ordered to bespeak the long glass tube for the Torricellian experiment.

June 18. Sir ROBERT MORAY president.

Mr. PALMER shewed three pieces of painted silk stuff.

Mr. CROUNE read Mr. EVELYN's account of the rolling-prefs.

Dr. GODDARD set several pieces of gold to anneal, and thereby shewed their alloys.

Mr. PALMER was desired to speak to Mr. GREGORY to come to the society, and inform them concerning the tinged stuffs.

Dr. GODDARD read his account of the experiments of refining of gold with antimony; which was ordered to be registered^c; and was afterwards published in the *Philosophical Transactions*^d.

Sir ROBERT MORAY read his *Account of the sounding of the depth of the sea between Portsmouth and the Isle of Wight, with the wooden globe and lead*; which was ordered to be registered^e, and was as follows:

“ Time of the submerſion and ſtay of the globe under water. Measure of the depth by a line.

| Seconds. | Yards. |
|----------------------------|-----------------|
| 22 — — — — — | 32 |
| 23 — — — — — | 33 |
| 7 $\frac{1}{4}$ — — — — — | 11 |
| 10 — — — — — | 15 |
| 6 — — — — — | 9 |
| 6 — — — — — | 9 $\frac{1}{2}$ |
| 13 $\frac{1}{2}$ — — — — — | 21 |

“ The time was measured by the vibrations of a piece of lead of about a pound weight, of a conical figure, hung at a small pack-thread of about 36 $\frac{1}{2}$ inches measured from the center of gravity of the lead.

“ The first two experiments were least exact, because not so often repeated as the rest, in regard to the current of the tide, which drew the boat to shallower water.

“ The others were repeated each of them twice or thrice.

^c Register-book, vol. i. p. 167.

^d N^o 138. p. 953. March 1678.

^e Register-book, vol. i. p. 178.

“ The

"The globe, when it came up at the greatest depth, leaped quite out of the water: but the agitation of the waves hindered the exact observation of it."

The operator was ordered to inquire concerning the length of time, during which fishermen keep their fish under water without feeding.

Sir WILLIAM PETTY proposed a standard for knowing the velocity of swimming bodies.

June 25. Mr. BOYLE president.

Mr. BOYLE brought in a glass with a composition in it, instead of a foil, for the making of looking-glasses.

PETER PETT, esq; and Mr. WILLIAM SCHROTER, were proposed as candidates by Mr. BOYLE; as was JAMES HAYES, esq; by Dr. WILKINS.

The operator gave an account of what he had done with respect to small fishes.

Mr. CROUNE and Mr. HILL were appointed a committee to review MERSENNUS concerning the tenacity of bodies.

Mr. WINTHROP was desired to communicate in writing the manner of making pitch and tar.

July 2. Sir ROBERT MORAY president.

It was ordered, that the committee appointed to view Mr. TOWGOOD's engine, meet the Saturday following, at two in the afternoon, in the Temple church.

Mr. BOYLE produced an experiment of the irregular motion of the oil of terebinthine upon spirit of wine; and likewise a mixture of fixt nitre resolved in distilled rain-water and spirit of wine, which shot into pieces.

Mr. BALLE produced two living crickets.

A new astronomical hypothesis of a stranger was referred to the consideration of the bishop of Exeter¹, Dr. WREN, Dr. POPE, Mr. CROUNE, and Mr. OLDENBURG.

A new method of music was recommended to the lord viscount Brouncker, Sir WILLIAM PETTY, Mr. BOYLE, Mr. BROOKE, and Mr. BALLE.

July 9. Sir ROBERT MORAY president.

¹ Dr. WARD, who was elected to that see July 8, 1662.

Mr.

Mr. OLDENBURG read a paper of collections concerning the generation of insects; and was desired to translate the whole book.

Mr. WINTHROP read his history of the making tar and pitch in New England; and was desired to prosecute it.

A report being made to the society by the lord viscount Brouncker, that Sir HENEAGE FINCH, his majesty's solicitor general, having signed the docket of the bill by him prepared for his majesty's signature, in order to letters patents for incorporating the society, had refused the fees due to him for the same out of respect to the said society; it was thereupon put to the question, and resolved, that Mr. Solicitor general be esteemed and accounted a benefactor to the society: and it was likewise ordered, that Sir JOHN FINCH, Dr. BAYNES, Sir WILLIAM PETTY, Dr. GODDARD, and Mr. PALMER, be appointed a committee to wait upon Mr. Solicitor, and give him the thanks of the society for his said favour and respect unto them.

The account of Mr. Towgood's engine was deferred till Dr. WILKINS should give in his report concerning it, or till Mr. Towgood should do it himself.

Dr. WREN and Dr. POPE were desired to continue the observations of Jupiter's satellites.

Before the next meeting of the society a charter passed on the 15th of July 1662, for the incorporation of the society under the title of the Royal Society, and appointing WILLIAM lord Brouncker the first president, and Sir ROBERT MORAY, knight, ROBERT BOYLE esq; WILLIAM BRERETON esq; eldest son of WILLIAM lord BRERETON, Sir KENELME DIGBY, knight, and chancellor to the queen mother, Sir PAUL NEILE, knight, one of the gentlemen of the privy chamber, HENRY SLINGESBY, esq; another of the said gentlemen of the privy chamber, Sir WILLIAM PETTY, knight, JOHN WALLIS, D. D. TIMOTHY CLARKE, M. D. and one of the physicians to his majesty, JOHN WILKINS, D. D. GEORGE ENT, M. D. WILLIAM AERSKINE, esq; cup-bearer to his majesty, JONATHAN GODDARD, M. D. and professor of physic in Gresham College, CHRISTOPHER WREN, L. L. D. ¹, and Savilian professor of astronomy at Oxford, WILLIAM BALLE, esq; MATTHEW WREN, esq; JOHN EVELYN, esq; THOMAS HENSHAW, esq; DUDLEY PALMER of Grey's-Inn, esq; and HENRY OLDENBURG, esq; of the council; WILLIAM BALLE, esq; the first treasurer; and Dr. JOHN WILKINS and Mr. OLDENBURG the first secretaries: all these officers to continue in their respective offices till St. Andrew's day following, the day of the anniversary election. The charter was in the following terms:

“ CAROLUS secundus Dei gratia Angliæ, Scotiæ, Franciæ & Hiberniæ rex, fidei
 “ defensor, &c. omnibus, ad quos præsentēs literæ pervenerint, salutem. Diu
 “ multumque apud nos statuimus, ut imperii fines, sic etiam artes atque scientias
 “ ipfas promovere. Favemus itaque omnibus disciplinis, particulari autem gratia
 “ indulgemus philosophicis studiis, præsertim iis, quæ solidis experimentis conantur
 “ aut novam extendere philosophiam, aut expolire veterem. Ut igitur inclarescant

¹ He is by mistake styled doctor of physic in the charter.

“ apud

“ apud nostros hujusmodi studia, quæ nusquam terrarum adhuc satis emicuerunt ;
 “ utque nos tandem univ[er]sus literarum orbis non solum fidei defensorum, sed
 “ etiam veritatis omnimodæ & cultorem ubique & patronum semper agnoscat :
 “ sciatis, quod nos de gratia nostra speciali ac ex certa scientia & mero motu nos-
 “ tris ordinavimus constituimus concessimus & declaravimus, ac per præsent[es] pro
 “ nobis heredibus & successoribus nostris ordinamus constituimus concedimus &
 “ declaramus, quod de cætero in perpetuum erit societas de prædicta^a concilio
 “ & sodalibus consistens, quæ vocabitur & nuncupabitur Regalis Societas ; & eandem
 “ societatem, per nomen præsidis concilii & sodalium regalis societatis, unum cor-
 “ pus corporatum & politicum in re fact[um] & nomine realiter & ad plenum pro
 “ nobis heredibus & successoribus nostris facimus ordinamus creamus & consti-
 “ tuimus per præsent[es], & quod per idem nomen habeant successionem perpetuam :
 “ & quod ipsi & eorum successores (quorum studia applicanda sunt ad rerum natu-
 “ ralium artiumque utilium scientiarum experimentorum fide ulterius promovendas)
 “ per idem nomen præsidis concilii & sodalium Regalis Societatis prædictæ, sint &
 “ erunt perpetuis futuris temporibus personæ habiles & in lege capaces ad haben-
 “ dum perquirendum percipiendum & possidendum terras & tenementa prata pas-
 “ cua pasturas libertates privilegia franchises jurisdictiones & hereditamenta quæ-
 “ cumque sibi & successoribus suis in feodo & perpetuitate, vel pro termino vitæ vita-
 “ rum vel annorum, seu aliter quocunque modo, ac etiam bona & catalla ac om-
 “ nes alias res cujuscunque fuerint generis naturæ speciei sive qualitatis ; necnon
 “ ad dandum concedendum dimittendum & assignandum eadem terras tenementa
 “ & hereditamenta bona & catalla, & omnia facta & res necessaria faciendum &
 “ exequendum de & concernentia eisdem^b, per nomen prædictum : & quod per
 “ nomen præsidis concilii & sodalium Regalis Societatis prædictum placitare & im-
 “ placitari, respondere & responderi, defendere & defendi, de cætero in perpetuum
 “ valeant & possint, in quibuscunque curiis placeis & locis, & coram quibuscun-
 “ que iudicibus & justiciariis & aliis personis & officiariis nostris heredum & suc-
 “ cessorum nostrorum, in omnibus & singulis actionibus placitis factis querelis
 “ causis materiis rebus & demandis quibuscunque, cujuscunque sint aut erunt ge-
 “ neris naturæ vel speciei ; eisdem modo & forma, prout aliqui ligi nostri intra
 “ hoc regnum nostrum Angliæ, personæ habiles & in lege capaces, aut ut aliquod
 “ corpus corporatum vel politicum intra hoc regnum nostrum Angliæ, habere
 “ perquirere recipere possidere dare & concedere, placitare & implacitari, respondere
 “ & responderi, defendere vel defendi, valeant & possint, valeat & possit : & quod
 “ iidem præses concilium & sodales Regalis Societatis prædictæ & successores sui ha-
 “ beant in perpetuum commune sigillum, pro causis & negotiis suis & successorum
 “ suorum quibuscunque agendis deserviturum ; & quod bene liceat & licebit eisdem
 “ præfidi concilio & sodalibus Regalis Societatis prædictæ, & successoribus suis pro
 “ tempore existentibus sigillum illud de tempore in tempus frangere mutare & de
 “ novo facere, prout iis melius fore videbitur expediri. Et, quod intentio nostra regia
 “ meliorem sortiatur effectum, ac pro bono regimine & gubernatione prædictæ Re-
 “ galis Societatis de tempore in tempus, volumus, ac per præsent[es] pro nobis he-
 “ dibus & successoribus nostris concedimus iisdem præfidi concilio & sodalibus Socie-
 “ tatis Regalis prædictæ & successoribus suis, quod de cætero in perpetuum concilium

^a Sic in Authentic.^b Sic in Authentic.

" prædictum erit & consistet ex viginti & una personis (quarum præsidem semper
 " unum esse volumus) & quod omnes & singulæ alie personæ, quæ intra unum
 " mensem proximum sequentem post datum præsentium per præsidem & concilium,
 " & in omni tempore sequenti per præsidem concilium & sodales, in eandem
 " societatem accipiantur & admittentur ut membra Regalis Societatis prædictæ, &
 " in registro per ipsos conservando annotatæ fuerint, erunt vocabuntur & nuncu-
 " pabuntur sodales Regalis Societatis prædictæ: quos, quanto eminentius omnis
 " generis doctrinæ bonarumque literarum studio clarescant, quanto ardentius hu-
 " jusce societatis honorem studia & emolumentum promoveri cupiant, quanto vitæ
 " integritate morumque probitate ac pietate emineant, & fidelitate animique erga
 " nos coronam & dignitatem nostram sincero affectu polleant; eo magis idoneos
 " & dignos, qui in sodalium ejusdem societatis numerum adfiscantur, omnino
 " censeari volumus. Et, pro meliori executione voluntatis & concessionis nostræ
 " in hac parte, assignavimus nominavimus constituimus & fecimus, ac per præsen-
 " tes pro nobis heredibus & successoribus nostris assignamus nominamus constituimus
 " & facimus, prædictum & fidelem nobis WILLIELMUM vicecomitem
 " BROUNCKER, cancellarium præcharissimæ consorti nostræ reginæ CATHERINÆ,
 " fore & esse primum & modernum præsidem Regalis Societatis prædictæ; volen-
 " tes quod prædictus WILLIELMUS vicecomes BROUNCKER in officio præsidis Re-
 " galis Societatis prædictæ a datu præsentium usque ad festum sancti Andree
 " proximum sequens post datum præsentium continuabit, & quousque unus alius
 " de concilio Regalis Societatis prædictæ pro tempore existente ad officium illud de-
 " bito modo electus præfectus & juratus fuerit, juxta ordinationem & provisionem
 " in his præsentibus inferius expressam & declaratam (si prædictus WILLIELMUS
 " vicecomes BROUNCKER tam diu vixerit) sacramento corporali in omnibus & per
 " omnia officium illud tangentia bene & fideliter exequendum, secundum veram
 " intentionem harum præsentium, coram prædicto & perquam fideli confan-
 " guineo & consiliario nostro EDUARDO comite CLARENDON cancellario nostro
 " Angliæ prius præstito; cui quidem EDUARDO comiti CLARENDON cancellario
 " nostro prædicto sacramentum prædictum administrare plenam potestatem & au-
 " thoritatem damus & concedimus, in hæc verba sequentia, viz. *I WILLIAM vis-
 " count BROUNCKER do promise to deal faithfully and honestly in all things belonging to
 " the trust committed to me, as president of this Royal Society, during my employment in
 " that capacity. So help me God.* Assignavimus etiam constituimus & fecimus, ac
 " per præsentibus pro nobis heredibus & successoribus nostris facimus, dilectos nobis
 " & fideles ROBERTUM MORAY militem unum a secretioribus nostris conciliis in
 " regno nostro Scotiæ, ROBERTUM BOYLE armigerum, WILLIELMUM BRERETON
 " armigerum filium primogenitum baronis de BRERETON, KENELM DIGBY mili-
 " tem præcharissimæ matri nostræ MARIÆ reginæ cancellarium, PAULUM NEILE
 " militem unum generosorum cameræ privæ nostræ, HENRICUM SLINGSBY ar-
 " migerum alium generosorum prædictæ privæ cameræ nostræ, WILLIELMUM
 " PETTY militem, JOHANNEM WALLIS in theologia doctorem, TIMOTHEUM
 " CLARKE in medicinis doctorem & unum medicorum nostrorum, JOHANNEM
 " WILKINS in theologia doctorem, GEORGIUM ENT in medicinis doctorem,
 " WILLIELMUM AERSKINE unum a poculis nostris, JONATHAN GODDARD in me-
 " dicinis doctorem & professorem collegii de Gresham, CHRISTOPHERUM WREN
 " in medicinis doctorem Saville astronomiæ professorem in academia nostra Oxoni-
 " ensi,

“ enſi, WILLIELMUM BALLE armigerum, MATTHÆUM WREN armigerum, JOHANNEM EVELYN armigerum, THOMAM HENSHAW armigerum, DUDLY PALMER de Grey's-Inn in comitatu noſtro Middleſexiæ armigerum, & HENRICUM OLDENBURG armigerum, una cum præſide prædicto, fore & eſſe primos & modernos viginti & unum de concilio Regalis Societatis prædictæ, continuandos in eiſdem officiis a datu præſentium uſque ad prædictum feſtum ſancti Andree apoſtoli proximum ſequens, & deinde quouſque aliæ idoneæ perſonæ & habiles & ſufficientes in officia prædicta electæ præſectæ & juratæ fuerint (ſi tam diu vixerint, aut pro aliqua juſta & rationabili cauſa non amotæ¹ fuerint) ſacramentis corporalibus coram præſide prædictæ Regalis Societatis ad officia ſua bene & fideliter in omnibus & per omnia officia i la tangentia exequendum prius præſtandis, ſecundum formam & effectum prædicti ſacramenti, mutatis mutandis, præſidi Regalis Societatis prædictæ per cancellarium noſtrum Angliæ adminiſtrandi (cui quidem præſidi pro tempore exiſtenti ſacramenta prædicta adminiſtrare plenam poteſtatem & authoritatem pro nobis hereditibus & ſucceſſoribus noſtris damus & concedimus per præſentes) & quod eadem perſonæ ſic, ut præfertur, ad concilium prædictæ Regalis Societatis electæ præſectæ & juratæ, & in poſterum eligendæ præficiendæ & jurandæ de tempore in tempus, erunt & exiſtent auxiliantes conſulentes & aſſiſtentes in omnibus materiis rebus & negotiis meliorem regulationem gubernationem & directionem prædictæ Regalis Societatis, & cujuſlibet membri ejusdem, tangentibus ſeu concernentibus. Et ulterius volumus, ac per præſentes pro nobis hereditibus & ſucceſſoribus noſtris concedimus præſatis præſidi concilio & ſodalibus Regalis Societatis prædictæ & ſucceſſoribus ſuis, quod præſes concilium & ſodales Regalis Societatis prædictæ pro tempore exiſtentes (quorum præſidem pro tempore exiſtente unum eſſe volumus) de tempore in tempus perpetuis futuris temporibus poteſtatem & authoritatem habeant & habebunt nominandi & eligendi, & quod eligere & nominare poſſint & valeant, quolibet anno in prædicto feſto ſancti Andree, unum de concilio prædictæ Regalis Societatis pro tempore exiſtente, qui ſit & erit præſes Regalis Societatis prædictæ uſque ad feſtum ſancti Andree apoſtoli exinde proximum ſequens (ſi tam diu vixerit, aut interim pro aliqua juſta & rationabili cauſa non amotus fuerit) & exinde, quouſque unus alius in officium præſidis Regalis Societatis prædictæ electus præſectus & nominatus fuerit; quodque ille, poſtquam ſic, ut præfertur, electus & nominatus fuerit in officium præſidis Regalis Societatis prædictæ, antequam ad officium illud admittatur, ſacramentum corporale coram concilio ejusdem Regalis Societatis, aut aliquibus ſeptem vel pluribus eorum, ad officium illud recte bene & fideliter in omnibus officium illud tangentibus exequendum præſtabit, ſecundum formam & effectum prædicti ſacramenti, mutatis mutandis (cui quidem concilio, aut aliquibus ſeptem vel pluribus eorum, ſacramentum prædictum adminiſtrare pro nobis hereditibus & ſucceſſoribus noſtris plenam poteſtatem & authoritatem de tempore in tempus, quotieſcunque neceſſarium fuerit, damus & concedimus per præſentes) & quod poſt huiusmodi ſacramentum ſit, ut præfertur, præſtitum officium præſidis Regalis Societatis prædictæ uſque ad feſtum ſancti Andree apoſtoli exinde proximum ſequens exequi valeat & poſſit: & ſi contigerit præſidem Regalis Societatis prædictæ pro tempore exiſtente aliquo tempore, quamdiu fuerit in officio præſidis

¹ Sic in Authent.

" ejusdem Regalis Societatis obire vel ab officio suo amoveri ; quod tunc & toties
 " bene liceat & licebit concilio & sodalibus prædictæ Regalis Societatis, vel ali-
 " quibus septem vel pluribus eorum (quorum præsidem^a concilii prædicti ad talem
 " electionem semper unum esse volumus) alium de prædicto numero concilii præ-
 " dicti in præsidem Regalis Societatis prædictæ eligere & præficere ; & quod ille
 " sic electus & præfectus officium illud habeat & exerceat durante residuo ejusdem
 " anni, & quousque alius ad officium illud debito modo electus & juratus fuerit,
 " sacramento corporali in forma ultime specificata prius præstando ; & sic toties
 " quoties casus sic acciderit. Et ulterius volumus, quod quodocunque contigerit
 " aliquem vel aliquos de concilio Regalis Societatis prædictæ pro tempore existente
 " mori, vel ab officio illo amoveri, vel decedere (quos quidem de concilio Regalis
 " Societatis prædictæ & eorum quemlibet pro male se gerendo aut aliqua alia rati-
 " onabili causa amobiles esse volumus ad beneplacitum præsidis & cæterorum de
 " concilio prædicto superviventium & in officio illo remanentium vel majoris par-
 " tis eorundem, quorum præsidem pro tempore existentem unum esse volumus)
 " quod tunc & toties bene liceat & licebit præfatis præfidi concilio & sodalibus
 " Regalis Societatis prædictæ, vel majori parti eorundem (quorum præsidem Reg-
 " alis Societatis prædictæ pro tempore existentem unum esse volumus) unum
 " alium vel plures alios de sodalibus Regalis Societatis prædictæ, loco sive locis ip-
 " sius vel ipsorum sic mortuorum decedentium vel amotorum, ad supplendum præ-
 " dictum numerum viginti & unius personarum de concilio Regalis Societatis præ-
 " dictæ nominare eligere & præficere : & quod ille sive illi sic in officio illo electi
 " & præfecti¹ idem officium habeat & habeant usque ad festum sancti Andree
 " apostoli tunc proximum sequens, & exinde, quousque unus alius vel plures alii
 " electus præfectus & nominatus fuerit electi præfecti & nominati fuerint ; sacra-
 " mento corporali ad officium illud in omnibus & per omnia officium illud tangen-
 " tia coram præfide & concilio Regalis Societatis prædictæ, vel aliquibus septem
 " vel pluribus eorum pro tempore existentibus, bene & fideliter exequendum, se-
 " cundum veram intentionem præfentium, prius præstando. Et ulterius volumus,
 " ac per præfentes pro nobis heredibus & successoribus nostris concedimus præfatis
 " præfidi concilio & sodalibus prædictæ Regalis Societatis & successoribus suis,
 " quod ipsi & successores sui quolibet anno, in prædicto festo sancti Andree apos-
 " toli, plenam potestatem & auctoritatem habeant & habebunt eligendi nominandi
 " præficiendi & mutandi decem de sodalibus Regalis Societatis prædictæ, ad sup-
 " plendum loca & officia decem prædicti numeri viginti & unius de concilio Reg-
 " alis Societatis prædictæ ; quoniam regiam voluntatem nostram esse declaramus,
 " & per præfentes pro nobis heredibus & successoribus nostris concedimus, quod
 " decem de concilio prædicto, & non amplius, per præsidem concilium & sodales
 " Regalis Societatis prædictæ annuatim mutati & amoti fuerint. Volumus etiam,
 " & pro nobis heredibus & successoribus nostris concedimus præfatis præfidi concilio
 " & sodalibus prædictæ Regalis Societatis & successoribus suis, quod si con-
 " tingerit præsidem ejusdem Regalis Societatis pro tempore existentem ægritudine
 " vel infirmitate detineri, vel in servitio nostro heredum vel successorum nostrorum
 " versari, vel aliter esse occupatum, ita quod necessariis negotiis ejusdem Regalis
 " Societatis officium præsidis tangentibus attendere non poterit ; quod tunc &

^a Sic in Authent.¹ Sic in Authent.

" toties

" toties bene liceat & licebit eidem præfidi sic detento versato vel occupato unum
 " de concilio prædictæ Regalis Societatis pro tempore existente, fore & esse depu-
 " tatum ejusdem præsidis, nominare & appunquare: qui quidem deputatus, in
 " officio deputati præsidis prædicti sic faciendus & constituendus, sit & erit depu-
 " tatus ejusdem præsidis de tempore in tempus, toties quoties prædictus præfides sic
 " abesse contigerit, durante toto tempore, quo prædictus præfides in officio præsidis
 " continuaverit; nisi interim prædictus præfides Regalis Societatis prædictæ pro
 " tempore existens unum alium de prædicto concilio ejus deputatum fecerit & con-
 " stituerit: & quod quilibet hujusmodi deputatus prædicti præsidis, sic, ut præ-
 " fertur, fiendus^a & constituendus omnia & singula, quæ ad officium præsidis præ-
 " dictæ Regalis Societatis pertinent seu pertinere debent, vel per prædictum præ-
 " sidem virtute harum literarum nostrarum patentium limitata & appunctata fore^b
 " facienda & exequenda de tempore in tempus, toties quoties prædictus præfides sic
 " abesse contigerit, durante tali tempore, quo deputatus prædicti præsidis continu-
 " averit, facere & exequi valeat & possit, vigore harum literarum nostrarum paten-
 " tium, adeo plene libere & integre ac in tam amplis modo & forma, prout præfides
 " prædictus, si præfens esset, illa facere & exequi valeret & posset; sacramento
 " corporali super sancta Dei evangelia in forma & effectu ultime specificatis per
 " hujusmodi deputatum ad omnia & singula, quæ ad officium præsidis pertinent,
 " bene & fideliter exequendum, coram præfato concilio prædictæ Regalis Socie-
 " tatis, vel aliquibus septem vel pluribus eorum, prius præstando; & sic toties
 " quoties casus si acciderit: cui quidem concilio, vel aliquibus septem vel pluribus
 " eorum pro tempore existentibus, sacramentum prædictum administrare potesta-
 " tem & auctoritatem, quoties casus sic acciderit, damus & concedimus per præ-
 " sentes, absque aliquo brevi commissione sive ulteriori warranto in ea parte a nobis
 " heredibus vel successoribus nostris procurando seu obtinendo. Et ulterius volu-
 " mus, ac per præfentes pro nobis heredibus & successoribus nostris concedimus
 " præfatis præfidi concilio & sodalibus Regalis Societatis prædictæ & successori-
 " bus suis, quod ipsi & successores sui de cætero in perpetuum habeant & habe-
 " bunt unum thesaurarium, duos secretarios, unum clericum, & duos servientes
 " ad clavas qui de tempore in tempus super præsidem attendant; quodque præ-
 " dicti thesaurarius secretarii clerici & servientes ad clavas eligendi & nominandi,
 " antequam ad officia sua separalia & respectiva exequendum admittantur, sacra-
 " menta sua corporalia in forma & effectu ultime specificatis, coram præfide &
 " concilio ejusdem Regalis Societatis, aut aliquibus septem vel pluribus eorum,
 " officia sua separalia & respectiva in omnibus illa tangentibus recte bene & fideliter
 " exequendum præstabunt; & quod post hujusmodi sacramenta sic, ut præ-
 " fertur, præstita officia sua respectiva exercent & utantur: quibus quidem præ-
 " fidi & concilio, aut aliquibus septem vel pluribus eorum, sacramenta prædicta
 " de tempore in tempus administrare prædictis separalibus & respectivis officariis
 " & successoribus suis plenam potestatem & auctoritatem damus & concedimus
 " per præfentes: & assignavimus nominavimus elegimus creavimus constituimus
 " & fecimus, ac per præfentes pro nobis heredibus & successoribus nostris assign-
 " avimus nominavimus eligimus creavimus constituimus & facimus, dilectos subditos
 " nostros WILLIELMUM BALLE armigerum fore & esse primum & modernum

^a Sic in Authent.^b Sic in Authent.

" thesau-

" thesaurarium, & prædictum * JOHANNEM WILKINS & HENRICUM OLDENBURG
 " fore & esse primos & modernos secretarios prædictæ Regalis Societatis, conti-
 " nuandos in eisdem officiis usque ad prædictum festum sancti Andree apostoli
 " proximum sequens post datum præsentium : quodque de tempore in tempus &
 " ad omnia tempora in prædicto festo sancti Andree apostoli (si non fuerit dies
 " dominicus, & si fuerit dies dominicus, tunc die proxime sequenti) præses concilii
 " & sodales prædictæ Regalis Societatis pro tempore existentes, aut major
 " pars eorumdem (quorum præsidem pro tempore existentem unum esse volumus)
 " alios probos & discretos viros de tempore in tempus in thesaurarium, secreta-
 " rios, clericum, & servientes ad clavos prædictæ Regalis Societatis, eligere nomi-
 " nare & præficere valeant & possint ; quodque illi, qui in separalia & respec-
 " tiva officia prædicta sic, ut præfertur, electi præfecti & jurati fuerint, officia illa
 " respectiva exercere & gaudere possint & valeant usque ad prædictum festum
 " sancti Andree extunc proximum sequens, sacramentis suis prædictis sic, ut præ-
 " fertur, prius præstandis ; & sic toties quoties casus sic acciderit : & si contigerit
 " aliquem vel aliquos officiariorum prædictorum ejusdem Regalis Societatis obire,
 " vel ab officiis suis respectivis amoveri ; quod tunc & toties bene liceat & licebit
 " prædicti concilio & sodalibus prædictæ Regalis Societatis, vel majori parti eo-
 " rundem (quorum præsidem pro tempore existentem unum esse volumus) alium
 " vel alios in officium sive officia illarum personarum sic defunctarum sive am-
 " tarum eligere & præficere ; & quod ille sive illi sic electus & præfectus electi &
 " præfecti officia prædicta respectiva habeat & exerceat habeant & exerceant du-
 " rante residuo ejusdem anni, & quousque alius sive alii ad officia illa respectiva de-
 " bito modo electus & juratus fuerit electi & jurati fuerint ; & sic toties quoties
 " casus sic acciderit. Et insuper volumus, ac de gratia nostra speciali ac ex certa
 " scientia & mero motu nostris concedimus præfatis prædicti concilio & sodalibus
 " Regalis Societatis prædictæ & successoribus suis, quod præses & concilium præ-
 " dictæ Regalis Societatis pro tempore existentes, & major pars eorumdem (quo-
 " rum præsidem pro tempore existentem unum esse volumus) pariter congregare
 " & assemblare possint & valeant in collegio sive alio publico loco sive aula intra
 " civitatem nostram London, vel in aliquo alio loco conveniente intra decem milli-
 " aria ejusdem civitatis nostræ ; & quod ipsi sic congregati & assemblati habebunt
 " & habeant plenam authoritatem potestatem & facultatem de tempore in tempus
 " condendi constituendi ordinandi faciendi & stabiliendi hujusmodi leges statuta
 " jura ordinationes & constitutiones, quæ eis, aut eorum majori parti, bona salu-
 " bria utilia honesta & necessaria juxta eorum sanas discretionem fore videbuntur,
 " & omnia quæcunque alia negotiis & rebus Regalis Societatis prædictæ spectan-
 " tia^p agendi & faciendi ; quæ omnia & singula leges statuta jura ordinationes &
 " constitutiones sic, ut præfertur, facienda volumus, & per præfentes pro nobis
 " heredibus & successoribus nostris firmiter injungendo præcipimus & mandamus,
 " quod de tempore in tempus inviolabiliter observata tuerint, secundum tenorem
 " & effectum eorumdem : ita tamen, quod prædicta leges statuta jura ordinationes
 " & constitutiones sic, ut præfertur, facienda & eorum quælibet sint rationabilia,
 " & non sint repugnantia nec contraria legibus consuetudinibus juribus sive sta-
 " tutis hujus regni nostri Angliæ. Et ulterius de ampliori gratia nostra speciali

* Sic in Authent.

p Sic in Authent.

" ac ex certa scientia & mero motu nostris dedimus & concessimus, ac per
 " præfentes pro nobis heredibus & successoribus nostris damus & concedimus,
 " præfatis concilio & fodalibus prædictæ Regalis Societatis & successoribus suis
 " plenam potestatem & auctoritatem de tempore in tempus eligendi nominan-
 " di & constituendi unum vel plures typographos sive impressores, & chalcog-
 " graphos seu sculptores; et ipsi vel ipsi per scriptum communi sigillo prædictæ
 " Regalis Societatis sigillatum, & manu præsidis pro tempore existentis signatum,
 " facultatem concedendi, ut imprimant talia res materias & negotia prædictam so-
 " cietatem tangentia vel concernentia, qualia prædictis typographo vel impressori,
 " chalcographo vel sculptori, vel typographis vel impressoribus, chalcographis
 " vel sculptoribus, de tempore in tempus per præsidem et concilium prædictæ
 " Regalis Societatis, vel aliquos septem vel plures eorum (quorum præsidem pro
 " tempore existentem unum esse volumus) commissa fuerint; sacramentis suis cor-
 " poralibus, antequam ad officia sua exercendum admittantur, coram præfide &
 " concilio pro tempore existentibus, vel aliquibus septem vel pluribus eorum, in
 " forma et effectu ultime specificatis, prius præstandis; quibus quidem præfidi &
 " concilio, vel aliquibus septem vel pluribus eorum, sacramenta prædicta admi-
 " nistrare plenam potestatem & auctoritatem damus & concedimus per præfentes.
 " Et ulterius, quod prædicti præfides concilium & sodales prædictæ Regalis Societa-
 " tis in philosophicis suis studiis meliorem fortiantur effectum, de ampliori gratia
 " nostri speciali ac ex certa scientia et mero motu nostris dedimus et concessimus,
 " ac per præfentes pro nobis heredibus & successoribus nostris damus & concedi-
 " mus, prædictis præfidi concilio & fodalibus prædictæ Regalis Societatis & suc-
 " cessoribus suis, quod ipsi & successores sui de tempore in tempus habeant & ha-
 " bebunt plenam potestatem & auctoritatem de tempore in tempus, & ad talia
 " tempestiva tempora, secundum eorum discretionem, requirere capere & reci-
 " pere cadavera talium personarum, quæ mortem manu carnificis passi fuerunt, &
 " ea anatomizare, in tam amplis modo & forma, & ad omnes intentiones & pro-
 " posita, prout Collegium Medicorum & Corporatio Chirurgorum civitatis nostræ
 " London eisdem cadaveribus usi vel gavisi fuerunt, aut uti vel gaudere va eant
 " & possint. Et ulterius, pro melioratione experimentorum artium & scientia-
 " rum prædictæ Regalis Societatis, de abundantiori gratia nostra speciali ac ex
 " certa scientia & mero motu nostris dedimus & concessimus, ac per præfentes
 " pro nobis heredibus & successoribus nostris damus & concedimus, præfatis præ-
 " fidi concilio & fodalibus prædictæ Regalis Societatis & successoribus suis, quod
 " ipsi & successores sui de tempore in tempus habeant & habeant plenam potesta-
 " tem & auctoritatem per literas vel epistolâs, sub manu prædicti præsidis in præ-
 " sentia concilii, vel aliquorum septem vel plurium eorum, & in nomine Regalis
 " Societatis, ac communi sigillo suo prædicto sigillatas, mutuis intelligentiis fru-
 " entur^a, & notitiis cum omnibus & omnimodis personis peregrinis & alienis,
 " utrum privatis vel collegiatis, corporatis vel politicis, absque aliqua molestia
 " interruptione vel inquietatione quæcunque: Proviso tamen, quod hæc in-
 " dulgencia nostra sic, ut præfertur, concessa ad ulteriorem non extendatur usum,
 " quam particulare beneficium & interesse prædictæ Regalis Societatis in materiis
 " seu rebus philosophicis mathematicis aut mechanicis. Et ulterius dedimus &

^a Sic in Authent.^{aa} concess-

"concessimus, ac per præsentés pro nobis heredibus & successoribus nostris damus
 " & concedimus, præfatis præfidi concilio & sodalibus Regalis Societatis prædictæ
 " & successoribus suis plenam potestatem & auctoritatem erigendi ædificandi &
 " extruendi, aut erigi ædificari & extrui faciendi vel causandi, intra civitatem no-
 " stram *London*, vel decem milliaria ejusdem, unum vel plura collegium vel col-
 " legia cujuscunque modi vel qualitatis, pro habitatione assemblatione & congre-
 " gatione prædictorum præfidi concilii & sodalium prædictæ Regalis Societatis
 " & successorum suorum, negotia sua & alias res eandem Regalem Societatem
 " concernentia ad ordinandum & disponendum. Et ulterius volumus, ac per
 " præsentés pro nobis heredibus & successoribus nostris ordinamus constituimus
 " & appunctuamus, quod si aliqui abusus vel discrepantiæ in posterum orientur
 " & accident de gubernatione aut aliis rebus vel negotiis prædictæ Regalis So-
 " cietatis, unde ejusdem constitutioni stabilimini & studiorum progressui vel rebus
 " & negotiis aliqua inferatur injuria vel impedimentum; quod tunc & toties per
 " præsentés pro nobis heredibus & successoribus nostris autorizamus nominamus
 " assignamus & constituimus præfatum prædilectum & perquam fidelem consanguin-
 " eum & conciliarium nostrum *EDWARDUM* comitem *CLARENDON*, cancellarium
 " nostrum regni nostri Angliæ, per seipsum durante vita sua, & post ejus mor-
 " tem tunc archiepiscopum Cantuariensem, cancellarium vel custodem magni si-
 " gilli Angliæ, Thesaurarium Angliæ, episcopum Londinensem, custodem priv-
 " vati sigilli, & duos principales secretarios, pro tempore existentes, aut aliquos
 " quatuor vel plures eorum, easdem discrepantias & abusus reconciliare compo-
 " nere & reducere. Et ulterius volumus, ac per præsentés pro nobis heredibus
 " & successoribus nostris firmiter injungendo præcipimus & mandamus omnibus
 " & singulis justiciariis, majoribus, aldermannis, vicecomitibus, ballivis, conta-
 " bulariis, & aliis officiariis ministris & subditis nostris heredum & successorum
 " nostrorum quibuscunque; quod de tempore in tempus sint auxilantes & assi-
 " stentes prædictis præfidi concilio & sodalibus Regalis Societatis prædictæ & suc-
 " cessoribus suis in omnibus & per omnia, secundum veram intentionem harum
 " literarum nostrarum patentium. Eo, quod expressa mentio de vero valore an-
 " nuo, vel de certitudine præmissorum sive eorum alicujus, aut de aliis donis sive
 " concessionibus per nos seu per aliquem progenitorum sive prædecessorum no-
 " strorum, præfatis præfidi concilio & sodalibus Regalis Societatis ante hæc tem-
 " pora factis, in præsentibus minime facta existit, aut aliquo statuto actu ordina-
 " tione provisione proclamatione sive restrictione in contrarium inde antehac habitis
 " factis editis ordinatis sive provis, aut aliqua alia re causa vel materia quacunque,
 " in aliquo non obstante. In cujus rei testimonium has literas nostras fieri fecimus
 " patentes. Teste meipso apud Westmonasterium, quinto decimo die Julii, anno
 " regni nostri decimo quarto.

Per ipsum regem.

HOWARD."

Read the 13th of August 1662.

Not

Not long before the passing of this patent, the society lost, by death, one of its most considerable members, Mr. LAURENCE ROOKE, descended from a good family of that name at Monks Horton in Kent¹, and born at Deptford in that county², about the year 1622³. From Eton-school, where he had his first education, he was transplanted to King's-college in Cambridge, in 1639⁴, but he was not a scholar of the house⁵. He was admitted to the degree of bachel'or of arts by proxy, on account of illness, on the 29th of February, 1644, and in 1647 commenced master of arts⁶, and then retired to his estate in Kent. But in the year 1650 he went to Oxford, and settled in Wadham-college, for the sake of Dr. WILKINS, who was then warden, and Mr. SETH WARD, the Savilian professor of astronomy, a member of that college⁷. The assemblies of several learned and curious gentlemen at the warden's lodgings, for the purpose of cultivating natural and experimental philosophy, being highly agreeable to Mr. ROOKE's genius and course of studies, he was admitted among them, becoming a gentleman commoner of Wadham-college, where he continued some years, accompanying Mr. BOYLE in his chemical operations⁸.

He was chosen to succeed Mr. SAMUEL FOSTER, deceased, in the professorship of astronomy at Gresham-college, on the 23d of July, 1652. He made some observations at Oxford upon the comet, that appeared in December of that year, which were published the year following in Mr. SETH WARD's *Prælectio de Cometis*, printed at Oxford in 4to; and in the year 1655, Dr. WALLIS dedicated to these two friends of his his treatise *De Sectionibus Conicis*.

Upon Dr. WHISTLER's resignation of the professorship of geometry in Gresham-college, Aug. 7, 1657, Mr. ROOKE was permitted to exchange that of astronomy for it; probably for the conveniency of the lodgings, which opened behind the reading hall, and on that account were proper for the reception of those gentlemen, after the lectures, who were afterwards incorporated under the name of the Royal Society, the institution of which was zealously promoted by Mr. ROOKE⁹.

The marquis of DORCHESTER, who was not only a patron of learning, but a considerable master of it himself, having a peculiar regard for Mr. ROOKE, used to entertain him, after the restoration, at his seat at Highgate, and bring him every Wednesday in his coach to the meeting of the Royal Society at Gresham-college. But the last time Mr. ROOKE was at Highgate, walking from thence in the heat of the summer, he caught cold, which occasioned a fever, that put an end to his life at his apartment in Gresham-college, on the 27th of June, 1662¹⁰, on the very night, which he had for some years expected, wherein to finish his accurate observations

¹ Wood's Athen. Oxon. vol. ii. col. 297.

² Dr. WARD's Lives of the Professors of Gresham-college, p. 97.

³ In the epitaph on him, written by Dr. BATHURST, he is said to have been in the 40th year of his age at his death, in 1662.

⁴ Wood, ubi supra.

⁵ Dr. WARD, ubi supra.

⁶ Id. ib.

⁷ Wood, ubi supra.

⁸ Id. ib.

⁹ Dr. WARD, ubi supra, p. 91.

¹⁰ Dr. POPE's Life of Dr. SETH WARD, bishop of Salisbury, p. 119—121.

on the satellites of Jupiter'. And so intent was he to the last upon completing his theory of that planet, that during the sickness, which proved fatal to him, after mentioning to Dr. POPE, that he wanted but one observation more, that which might be made on the night of his death, to perfect that theory, he desired him to go to the Royal Society, and request of them, that since it was now impossible for him to make that observation, they would appoint some other person to do it'. By a nuncupatory will, he left what he had to Dr. WARD^c, not long before advanced to the bishopric of Exeter, whom he permitted to receive what was due upon bond, if the persons bound offered payment willingly; otherwise, he would not have the bonds put in suit: "For, said he, as I never was in law, or had any contention with any man in my life, neither would I after my death'." He was interred very decently by the bishop of Exeter in the church of St. Martin Outwich in Bishopgate-street, his corps being attended by most of the fellows of the Royal Society then in London. The bishop designed likewise at first to have erected a monument to him, with an inscription drawn up by Dr. BATHURST; but afterwards, instead of that, gave the Royal Society, in memory of his friend, a large pendulum clock, made by FROMANTEL, which was set up in the room, where they met in Gresham college, but is now out in the hall of their house in Crane-court, Fleetstreet, with these words engraven upon the middle of the dial-plate:

SOCIETATI REGALI AD SCIENTIAM NATURALEM PRIMOVENDAM INSTITUTÆ
DONO DEDIT
REVERENDUS IN CHRISTO PATER SETHUS EPISCOPO EXON.
EJUSDEM SOCIETATIS SODALIS
IN MEMORIAM
LAURENTII ROOKE,
IN OMNI LITERARUM GENERE INSTRUCTISSIMI
IN COLLEGIO GRESHAMANSI PRIMUM ASTRONOMIÆ
DEIN GEOMETRIÆ PROFESSORIS
DICTÆQUE SOCIETATIS NUPER SODALIS, QUI OBIIT JUNII XXVI^o. MDCLXII.

He was of a melancholy temper and aspect, his complexion swarthy, his eyes more than ordinarily sunk in his head, and his voice hoarse and inward. He was profoundly skilled in all sorts of learning, not excepting botany and music, and the most abstruse points of divinity; always averse from asserting any thing positively, that was dubious; and when asked his opinion of an hypothesis, usually answering, *I have no opinion*; extremely modest, and sparing of his words, unless amongst his intimate friends^d. Mr. HOOKE^e places him with those most eminent for their knowledge and improvement in astronomy. Dr. SPRAT^f describes him as a man of a profound judgment, a vast comprehension, prodigious

^c SPAT's Hist. of the Royal Society, p. 189.

^d Dr. POPE, ubi supra p. 114.

^e Dr. WARD's Lives, &c. p. 92

^f Dr. POPE, p. 120.

^g Dr. BATHURST's Epitaph on him says, June 27; which difference must, as Dr. WARD, p. 93.

supposes, arise from the hour of the night, when he expired, either before or after 12 o'clock.

^h Dr. POPE, p. 111.

ⁱ Preface to his *Micrographia*.

^j Hist. of the Royal Society, p. 189.

memory,

memory, and solid experience. "His skill in the mathematics was revered by all lovers of these studies; and his perfection in many other sorts of learning deserves no less admiration. But, above all, his knowledge had a right influence on the temper of his mind, which had all the humility, goodness, calmness, strength, and sincerity of a sound and unaffected philosopher." But whoever would view his character in its proper extent, will have great satisfaction in seeing it represented by the masterly pen of his successor, Dr. BARROW, in his inaugural oration at Gretham-college.

July 16. Sir ROBERT HARLEY subscribed his name.

Mr. WINTHROP brought in the following account *Of the manner of making Tar and Pitch in New England*, which was ordered to be registered¹:

"Tar is made out of that sort of pine-tree, out of which cometh naturally a kind of turpentine, which, at the first flowing out of the tree, is liquid and clear, but being hardened by drying upon the tree, or any place upon which it hath fallen, is not much unlike the Burgundy-pitch.

"The greatest quantity of those pines, of which tar and pitch is made, which are commonly called pitch-pines, grow upon the most barren plains, yet in some places upon rocky hills also; but such hills are usually amongst those plains. There are of those pines in several parts of New England, but the most tar is made about Connecticut, above fifty miles up the river, where there be great plains of those pines on both sides the river, something up into the land from the river side. There hath been tar also made in the colony of the Massachusetts. and New Plymouth: there are of those plains also in many parts of the sea-coast, and up far into the country, and in the eastern parts towards Nova Scotia. In those plains, and other places, where that pitch-pine groweth, are found many trees, which have been blown down, among which some have been lodged there so long time (it may be many ages) that the whole body of the tree, and all the boughs and roots thereof, are rotted, and only the knots of those boughs left (those knots are that part, where the bough is joined to the body of the tree). Those knots will lie in the same distances as they grew upon the tree, the whole length of the tree, and not any part of the body, or boughs left, being all rotted and burnt up by the often burning of the ground, which is every year set on fire by the Indians; and so, with the dry withered grafs and weeds, are burnt up by degrees (some part one year, and some another) all the dry boughs, or other wood, sound or rotten, that lieth amongst them, except these pine knots, which only escape the fury of the fire, though scorched black, some of them, thereby. In some places, where there is little grafs or woods, whereby the fire may run, the rest of the bough is only rotted from the knot: the knot is apt enough to burn very fairly, where they are on a heap together, but lying singly they do not retain the fire, which passeth over them, which is the reason they are not consumed like other dry rotten wood.

¹ Register-book, vol. i. p. 179.

“ These knots are the usual material, of which the tar in that country is made, being full impregnated with that terebinthine or resinous matter, which, by the heat of the fire, is driven out of them. It may appear of how balsamic a nature that is, that can preserve the wood from rotting, it may be many hundred years, though exposed to all weathers; and it is evident, that those knots have so continued a very long time; for there are upon the same plain trees, which have been blown down, that shew their several degrees of decay, and exceed the memory of the oldest of the natives, as to the time they were laid by the violence of the wind.

“ The rest of the tree doth contain (both bough and body) some of the like terebinthine sap; for if a little chip of the tree, or of any bough, be cut, or some of the bark be taken off, there will, in a very short time, appear little round exudations, like a dew, of pure crystalline turpentine; but this is little, and more undigested than that which is in the knots, and mixed with more watery sap, leaving the wood more porous, and thereby subject to the impressions of the air and wet, whereby it soon decays. If it lies with the bark on, it sooner rotteth, the decay being hastened with worms, that breed between the bark and the wood.

“ Those, that intend to make tar, gather those knots on heaps, and then carry them together by carts to some convenient place not far off, where they find clay or loam fit for their use; and in that place they make an hearth, of such ordinary stone which is at hand and clay, so high from the ground, that a vessel may stand a little lower than the hearth, for receiving the tar as it runs out. This hearth is made of wideness, according to the quantity of knots they will set at once: the hearth also is made with a smooth floor of clay, and they make the hearth a little descending from the outward parts towards the middle, and thence to one side, where there is a gutter left for the tar to run out.

“ Upon this hearth they lay these knots, piling them up round together in the very same manner as those that burn charcoal, of an height proportionable to the breadth of the hearth, when they cover them over with a coat of clay or loam, or the best sort of earth the place will afford (but good clay is best, if it can be had near). They leave only on the top a small place open to put in fire, and for the smoke to go out, and some small holes round about at several heights, for so much air to go in, as is needful for the fire, which is regulated by these vent-holes at pleasure, stopping or opening them, or so many of them as there is cause. When this structure is all thus fitted, fire is put to it at the top, and when it is well on fire, that open place is stopped also, except a little vent, as much as is needful to keep the fire burning, by venting this smoke; and when all beginneth to be thorough hot, the tar, with some mixture of watery sap, will run downward to the hearth; and gathering from all parts toward the middle, runneth into that gutter before mentioned, and thence into a barrel or other vessel there placed to receive the same. So that the whole art of making tar is no other but a distillation *per descensum*, and may be also done in close vessels, by a fire-encompassing a vessel of earth or iron, in which the

“ pitch-

" pitch-wood may be contained ; but the other way is found to be the easiest and
 " most profitable way for making great quantities. When the tar is all run out,
 " they stop all the vents very close (as the colliers do in making charcoal) so they
 " have these knots made into excellent charcoal, which the smiths find to be the
 " best sort of coal for their use, that is made of wood, being not so apt to burn out
 " when their blast ceaseth ; neither do they sparkle in the fire as many other sort
 " of coals do ; and when they want sea-coal, they choose these rather than any
 " other, and give a greater price for them. Those same knots the planters split
 " out into small shivers, about the thickness of a finger, or thinner ; and those
 " they burn instead of candles, giving a very good light, and they call it candle-
 " wood, and it is much used both in New England and Virginia, and among the
 " Dutch planters in the villages. But because it is something offensive, by the
 " much fullying smoke that comes from it, they usually burn it in the chimney-
 " corner upon a flat stone or iron, except occasionally a single stick in their
 " hand, as there is need of light to go about the house. It must not be conceived,
 " by what is mentioned in the foregoing discourse, that only those knots, separated
 " from the body of the tree by devouring time, are the only material,
 " out of which tar can be made ; for there are in that country millions of living
 " trees, that have the same sort of knots full of such turpentine, of which, by that
 " kind of distillation, tar may be made : but the labour of felling the trees, and
 " cutting out those knots, would far exceed the value of the tar, that should be
 " the recompence of that labour, especially in that country, where labour is
 " very dear.

" But these knots heretofore mentioned are provided without any other labour
 " than gathering together ; and there is also sometimes found of those sorts of
 " pine-trees, whose whole body of the lower part towards the root is as full of
 " turpentine as the knots ; and of those also tar may be made in like manner as
 " the former ; but such trees being rarely found, we commonly prefer to split
 " out into candle-wood, because they will be easily riven out into any length
 " and bigness desired, much better than knots. There is an opinion, that by art,
 " the body of any living pine-tree, the lower part of it, six or eight feet high,
 " may be as fully impregnate with turpentine as the knots. And some have reported,
 " that such artifice is used in Norway. Several trials have been made
 " to that end, by girdling the tree (as they call it, cutting off some of the bark
 " round, and a little into the wood of the tree, about six feet from the ground ;
 " which hath not yet been found successful : but whether the right season of the
 " year was not taken, or what else omitted, is not known to those, that have
 " missed in such trials. It were worth inquiring, whether any such art be used in
 " Norway or Sweden, or elsewhere ; and what it is. Of tar, by boiling it a sufficient
 " height, pitch is made. In some places, where rosin is plenty and cheap,
 " a fit proportion of that may be dissolved in tar while it is boiling, and so
 " mixing with it, it sooner is boiled to pitch ; but this is something of different
 " kind from that, which is made of tar only without other mixture.

" There is another way, which some ship carpenters in that country have used
 " to bring their tar into pitch for any sudden use, which is thus : The tar is
 " made

"made so hot in an iron kettle over the fire, that it will easily take fire; then being let on fire in an open place, they let it burn so long, till by taking out a little for trial it appeareth, when cold, to be of a sufficient consistence; and then by covering the kettle the fire is extinguished, and so pitch is made in a short time.

"There is a way to make rosin also out of the same knots, by splitting them out into thin pieces, and then boiling them in water: the rosin will boil out, and gather together into a body, and will become a pure hard rosin, when it is cold."

Sir ROBERT MORAY promised to procure an account of the manner of making tar in Sweden.

Mr. BRERETON was desired to bring in Mr. WINTHROP's account of the making of pot ashes.

The amanuensis was ordered to write an account of the particularities of his diving under water in Sweden.

July 23. Mr BOYLE president.

The amanuensis was ordered to deliver in his account of diving at the next meeting.

Mr. BOYLE related his having extracted the air out of water in a tube, which let the water fall.

The amanuensis was ordered to translate from the French Monsieur HUYGENS's letter to Sir ROBERT MORAY, dated at the Hague July 14, 1662. N. S. containing some objections to some parts of Mr. BOYLE's *Defence of the doctrine touching the spring of the air against FRANCISCUS LINUS and Mr. HOBBS*.

July 30. The lord viscount Brouncker president.

The translation of Monsieur HUYGENS's letter of July 14, 1662, to Sir ROBERT MORAY by the amanuensis, was read by him, and ordered to be entered in the letter book^a.

Mr. BOYLE's letter to Sir ROBERT MORAY in answer to the objections of Monsieur HUYGENS in his letter above-mentioned, was read, and ordered to be registered^a, with another on the same subject written to Mr. BOYLE himself; who was desired to add these two letters to his book, when it should be reprinted.

The operator was ordered to carry Mr BOYLE's engine to Mr. OLDFIELD, in order to make the top of the cylinder of it and the sucker to meet together.

^a Vol. i. p. 33. ^a Ibid. p. 39.

Dr. GODDARD was desired to communicate the receipt of the *aurum musicum*, left with him by Mr. BALLE, which the doctor immediately did, and it was ordered to be registered*, and is as follows :

“ Take of sal armoniac and sulphur, of each one pound ; of mercury, two pounds ; melt one pound of block-tin, and cast the mercury therein ; then the salt, then the sulphur, and grind all these on a stone ; then put all these into an earthen pot or glass well luted or glued. Stop all the mouth but a little hole : or with a blind-head and a hole at the top so big as the top of the little finger may go in, and that no bigger, which leave open. Lute the head well on, and the body well luted, set them thus down in a subliming furnace, bearing it up with an iron bar, that the head may be above the furnace ; and lute the furnace-mouth over with horse-dung and clay, leaving vent-holes for the smoke and fire. Then put in fire, and when it is well fired, that the coals be all red, increase the fire for three hours. and look that the hole in the top of the glass be not stopped with vapour : if it be, open it, and to increase the fire till no vapour comes out : then it is enough ; cease the fire, and let it cool gently, and carefully take off the head from the body, and you shall see the pure matter hang in a ring about the neck of the glass as soft as butter. This is the best and truest way of making *aurum musicum*.

“ To make it fit for the use you desire, which is to make a brass or copper-colour on plaister statues. Take the *aurum musicum*, and grind it well on a painter's stone, so that all the grit and hard knobs be made small not to be felt : then grind it with fat linseed oil, such as is clarified in the sun ; and having first primed the statue with half umber and the other half yellow oker ground well, and laid on in oil, and being dry, work the thinner over it, and when it is dry, it will look like brass, and continue, if well wrought, an hundred years and more. If you will have it like copper, let the primage be two parts yellow oker, and one part red oker, with a little vermilion. If you will have it like an old brass statue, take a little verdigrease, or verditer, and grind it with the first primer, and it will have a glowing green, as you shall see in old ordnance or brass statues.

“ This was done to two emperor's heads above thirty years ago, and they look, being washed over, as fresh and as fine, as if they had been done but yesterday.”

Mr. WILBE was desired to bring his picture or image covered with *aurum musicum* to the next meeting.

The amanuensis was ordered to provide the long glass tube.

Mr. EVELYN was desired to write to Mr. JOHN BEALE concerning the matter of fact of ingrafting cocks-spurs on the heads of the fowl.

* Register-book, vol. i. p. 184.

August 6. Mr. WILDE brought in a piece of *aurum musicum*; and was desired to communicate his method of laying leaf-copper without tarnishing.

It was ordered, that Mr. BOND be added to the committee for trying the variation of the needle at Whitchall:

That the diving engine be prepared for use by the operator and amanuensis: And

That Dr. POPE and Mr. HILL consult the writers on the *Aqua solventes*.

Dr. CHARLTON was desired to give in writing the account of the boy killed by lightning.

Dr. GODDARD brought in an account of his *Experiments of weighing glass canes with the cylinders of quicksilver in them, according to the Torricellian experiment*; which was ordered to be registered².

August 13. It was ordered, that the particulars of the experiments proposed, and not performed, be laid before the chair at the next meeting.

Dr. CHARLTON read his account of the boy killed with lightning; which was ordered to be filed up.

Mr. PACKER subscribed his name.

Dr. GODDARD made an experiment with quicksilver, weighing it in the tube inverted.

The letters patents for the incorporation of this society were read by Mr. OLDENBURG; and it was voted,

That the president attended by the council, and as many of the society as can be obtained, should wait upon the king, after his coming from Hampton-Court to London, to give him humble thanks for his grace and favour: and that in the mean time the president should acquaint his majesty with their intention: and that afterwards the lord chancellor be thanked likewise, as also Sir ROBERT MORAY, for his concern and care in promoting the constitution of the society into a corporation.

Dr. WALLIS was desired to bring in writing his solution of Dr. GODDARD's experiment of weighing glass canes with the cylinders of quicksilver standing in them, according to the Torricellian experiment.

August 20. Dr. WALLIS's written discourse about Dr. GODDARD's experiment was delivered in; but because the understanding thereof depended greatly upon the

² Register book, vol. 1. p. 185. See Dr. WALLIS's *Mechanica*, par. iii. cap. 14. propos. 7. 8. Oxon. 1671. in 4to.

schemes annexed to it, the reading of it was deferred till the next meeting : and the amanuensis was ordered to draw the said schemes in great upon a large paper, that every member might look upon them with conveniency.

Sir ROBERT MORAY presented to the society two manuscripts composed by two gentlemen of Scotland ; the one treating of natural philosophy, and written by Mr. SINCLAIR ; the other, entitled *Optica Britannica*^a, written by Mr. JAMES GREGORY. The former was referred to the perusal and consideration of the lord viscount Brouncker, Sir ROBERT MORAY, Mr. BOYLE, and Dr. GODDARD ; and the latter to Dr. WHISTLER, Dr. POPE, and Mr. CROUNE.

Mr. HILL and Mr. CROUNE were desired to bring in an account of the tenacity of bodies out of Galileo and Mercennus : And

Mr. PALMER to speak to Mr. GREGORY the artist, about the new way of tinging stuffs.

It was ordered, that a copy of the experiments sent by Mr. CROUNE to Dr. POWER be given to Mr. SINCLAIR ; and that he be desired to make those in Scotland, which relate to the weighing things in great depths under ground.

Mr. BOYLE was desired to prosecute the experiments about the velocity of sounds, by great guns, to be procured by Sir ROBERT MORAY for that purpose :

Dr. GODDARD, Dr. CHARLTON, and Mr. CROUNE, to make experiments about echos : And

Dr. CHARLTON to inquire of Dr. SCARBURGH concerning the account of sounds, which he was formerly requested to communicate to the society, whether they might expect it from him.

Mr. POWLE was directed to be written to by Mr. OLDENBURG, that he would send the society an exact description of the whispering place in the cathedral of Gloucester.

Mr. BOYLE was requested to remember the prosecution of his experiments concerning colours and their various productions by mixture :

Mr. EVELYN to speak to Col. BLOUNT concerning his observations about the mensuration of ways :

Mr. OLDENBURG to peruse RICCIOLUS^b concerning the mensuration of the earth ; and to compare what that author hath said of the several methods thereof

^a It was printed at London in 1663 under the title of *Optica promota*. ^b JOHN BAPTISTA RICCIOLUS of Ferrara, a jesuit, professor of philosophy and school divinity at Parma and Bologna.

in his *Almagestum*¹ with what he hath said in his *Geographia* and *Hydrographia*²: And

Mr. BOYLE to bring his experiment, about the duck in the pneumatical engine, to the next meeting.

The amanuensis was ordered to translate into English, from the French, Monsieur HUYGENS's letter to Sir ROBERT MORAY, dated from the Hague the 18th of August, N. S. relating to Mr. HOBBS's duplication of the cube and quadrature of the circle, as also the height of the atmosphere; and to bring the said translation to the next meeting.

August 27. Dr. WALLIS's account of Dr. GODDARD's experiment of weighing mercutorial glass canes was read, and ordered to be registered³, and afterwards published by him⁴.

Dr. GODDARD propos'd the experiment of what force will compress the air into less dimensions, and in what proportion.

Sir ROBERT MORAY propos'd to inquire by experiments, what bore maketh a jet of water rise highest; and of what figure the end of the pipe must be for that purpose; alledging, that the end of the pipe being tapered, by that figure the cylinder of water incumbent on that bore presses more upon it, than by its own weight.

Dr. WREN was desired to peruse the earl of SANDWICH's observations made by him in his late voyage to Portugal and the Straits, and to compare them with those made here of the same kind.

It was ordered, that the earl of SANDWICH should have the thanks of the society given him by Sir PAUL NEILE, for his care and favour in making and communicating these observations; concerning which he should receive a farther account hereafter.

Mr. CROUNE was desired to make the experiment of shewing, that water will pass where air will not.

Upon the occasion of the manuscript philosophical books, which were presented to the society for their examination, and received a good character from those members, who had read them, it was ordered, that no books presented to the censure of the society shall receive a public approbation from them; but only, if the society think fit to refer such books to one or more of the fellows, esteemed by them competent judges thereof, that the report made thereof to the society by such fellows, may be communicated to the authors of the books thus presented; and that it may be signed by one of the secretaries.

August 29. In the afternoon of this day⁵ the president and council, with other members of the society, waited on the king, to return him the thanks of the society.

¹ Printed at Bologna in 1651. ² Printed at Bologna in 1661. ³ Register book, vol. i. p. 187.
⁴ *Mechanica*, part 3. ⁵ MS. of Dr. JOHN PELL. for

for the patent of their establishment : upon which occasion the president made the following speech to his majesty :

“ May it please your Majesty,

“ We your majesty's most loyal subjects, newly incorporated by your majesty's charter, and honoured with the name of the ROYAL SOCIETY, do with all humility present ourselves before your majesty, the royal founder thereof, to offer you our most hearty thank, as the only way we have at present to express our deep sense of your majesty's grace and favour to us, and to assure your majesty of our constant veneration for your sacred person, our devotion to your majesty's service, and our firm resolution to pursue sincerely and unanimously the end, for which your majesty hath founded this society, the advancement of the knowledge of natural things, and all useful arts, by experiments: A design, Sir, that is deservedly accounted great and glorious, and is universally reputed to be of that advantage to mankind, that your majesty is highly admired and extolled for setting it on foot; and this society is already taken notice of, and famous throughout all the learned parts of Europe; and doubtless in time will be much more by the continuance of your majesty's gracious favour, and the happy success of their endeavours, to the great increase of the fame of your majesty's prudence, which hath justly intitled you to the honour of laying the first foundation of the greatest improvement of learning and arts, that they are capable of, and which hath never heretofore been attempted by any: so that men cannot now complain, that the favour and assistance of a potent monarch is wanting to this long-wished for enterprise.

“ And, Sir, our assurance of this your majesty's favour and assistance is that, which gives vigour to our resolutions, and is the life of our hopes, that in due season we shall be able to make your majesty an acceptable present of choice and useful experiments, and accomplish your great design, being thereto engaged by so many powerful motives.

“ And in the mean time we shall daily pray, that God will be eminently gracious to your majesty, and accumulate upon you all the blessings answerable to the largeness of your heart, the height of your condition, the weight of your charge, the multitude of your virtues, and the desires and wishes of all your faithful subjects.”

The next day * they waited on the lord chancellor, to whom the president spoke as follows :

“ MY LORD,

“ All of us, whom your lordship hath thought fit to be members of the Royal Society, are come solemnly to acknowledge your lordship's favour to us, and to present our thanks, together with an assurance of our readiness to serve your

* Supplement to the letter-books, vol. i. p. 141.
supra, p. 145.

* MS. of Dr. PELL.

* Supplement, *ubi*

“ lordship upon all occasions, and of our desires to contribute the best we can to
 “ the greatness of your name, which is already far more illustrious than that of a
 “ learned predecessor of yours, a great and renowned chancellor of England^b, who
 “ is famous for having but pointed at that improvement of solid learning, which
 “ is now by your hand so vigorously and effectually carried on.

“ My lord, We are sensible of the importance of that duty now incumbent on
 “ us, to pursue diligently the ends, for which our society is constituted; and hope
 “ that our endeavours shall, by God’s blessing, become successful for the honour
 “ of the king, the royal founder of this society, and of your lordship, our noble
 “ patron, as well as for the good, not only of his majesty’s kingdoms, but of all
 “ mankind, and suitable to the great expectations of the learned abroad, who are
 “ already pleased to take notice of us. And the continuance of your lordship’s
 “ favour to us will both strengthen our confidence, and quicken our endeavours,
 “ and will give us cause to glory daily more and more in those vows, by which
 “ we have dedicated ourselves to your lordship’s service.”

September 3. At the meeting of the society, it was referred to Dr. WREN to take care of making the several experiments mentioned at the last meeting concerning the *aque salientes*.

The request of the society made at the last meeting to Dr. WREN about comparing the earl of SANDWICH’s experiments, was continued: but it being a business of difficulty and much calculation, required more time than he could yet obtain from his other employments.

The desire of the last meeting to Mr. CROUNE was continued.

The translation of Monsieur HUYGENS’s letter of the 18th of May was read, and ordered to be filed up^c.

The president gave an account to the society of his and the council’s address to the king in the name of the society, to return their humble thanks to his majesty for his favour in establishing them into a corporation by his letters patents; with his majesty’s answer of his peculiar esteem of the society, and his readiness to give them all due encouragement: as likewise of their address of thanks to the lord chancellor for his readiness to further that business; by whom they were very favourably received, and assured, that it was his purpose to come himself to the society to express his acknowledgments to them.

The lord viscount BOUNCKER was desired to deliver in a copy of the speech, which he made to his majesty, and of that to the lord chancellor, in the name of the society.

A Latin letter from JOHN FREDERIC GRONOVIVS, one of the professors at Leyden, to Mr. HAAK, dated at Leyden, August 18, 1662, expressing his high sense of

^b Lord BACON, viscount VERULAM. ^c The original is entered into the letter-book, vol. i. p. 64. the

the usefulness of the design of the society, was read, and ordered to be entered in the letter-book^d.

Sir GILBERT TALBOT, Dr. MERRET, Mr. HAAK, and Mr. HENSHAW were desired to assist in the translation of the Italian book about dying.

A manuscript discourse in French about taking heights and distances by a new way of catoptrics, was communicated by Sir ROBERT MORAY, and ordered to be translated against the next meeting.

Several experiments for improving husbandry by steeping seeds in salt liquors, were brought in by Sir ROBERT MORAY.

The bloody pond at Newington being discoursed of, it was suggested, that the appearance of it might be occasioned by a multitude of little worms, which upon their sinking down might cause the water to change the colour; these worms being visible in some ponds. Others conceived, that the colour might arise from some peculiar quality in the earth by an exudation from it, whence appear on the surface of the water sometimes green and sometimes red spots.

Dr. GODDARD's experiment about the weighing of the quicksilver tube was tried; and he was desired to bring an account of it in writing to the next meeting.

September 10. MERSENNUS's account of the tenacity of cylindrical bodies was read by Mr. CROUNE, to whom the prosecution of that matter by consulting Galileo was referred, when the translation of that Italian treatise, wherein Galileo treats of that subject, shall be printed.

It was ordered, that at the next meeting experiments should be made with wires of several kinds of the same size, viz. silver, copper, iron, &c. to see what weight would break them; Mr. CROUNE being appointed curator of this experiment.

The reading of the French manuscript, brought in by Sir ROBERT MORAY, about taking the heights and distances by catoptrics, was deferred till the description of the instrument should come.

Dr. GODDARD made an experiment concerning the force, which presseth the air into less dimensions; and it was found, that 12 ounces contracted $\frac{1}{13}$ part of air.

The lord viscount Brouncker was desired to send his glass to Dr. GODDARD, to make farther experiments about the force of pressing the air into less dimensions.

Dr. WREN was reminded of prosecuting Mr. ROOKE's observations concerning the motions of the satellites of Jupiter.

^d Vol. i. p. 44.

Dr.

Dr. CHARLTON read an essay of his concerning the velocity of sounds, direct and reflex; and was desired to prosecute the subject, and to bring his discourse to the next meeting, in order to its being registered.

Dr. GODDARD made the experiment to shew how much air a man's lungs may hold, by sucking up water into a separating glass after the lungs have been well emptied of air. Several members of the society trying it, some sucked up in one suction about three pints of water, one six, another eight pints and three quarters, &c. And it was observed what a variety there was of whistles or tones, made by the water at the several heights, in falling out of the glass again.

The account of zoophytal or animal ingraftings, received by Mr. EVELYN from a friend of his, was communicated by him, and registered*, as follows:

“ When my wife, says he, cuts the cocks for capons by plucking the feathers, and applying them warm in an incision of the comb; and there holding them under her finger for some minutes, till the gore-blood hath well cemented them, they grow without fail. Thus can she make any bright purple or other beautiful feather grow in the place of the crest. By the same address will the spur, taken fresh and warm from the heel of the cock, be made to grow in the place of the comb also.”

It was discoursed, whether there be any sex in trees and plants. Some instances were brought of palm-trees, plum-trees, hollics, ash-trees, quinces, pionies, &c. wherein a difference was said to be found in their bearing of fruit, or in their hardness and softness, or medicinal operations. It was remarked by some, that the difference, which is observed in trees with respect to fertility or sterility, may be produced by ingrafting. Sir ROBERT MORAY mentioned a French gentleman, who having been some time before in England, and being present at a meeting of the society, took notice, that the nature of all trees is to run altogether to wood; which was changed by a certain method of cutting them, whereby they were made, contrary to their nature, to bear fruit; and that according as this cutting was performed with more or less skill, the more or less fruitful the tree would be.

A proposition was offered by Sir ROBERT MORAY about the planting of timber in England, and the preserving of what was then growing.

Mr. BOYLE shewed a puppy in a certain liquor, in which it had been preserved during all the hot months of the summer, though in a broken and unsealed glass.

Sir JAMES SHAEN, knt. was proposed as a candidate by Sir ROBERT MORAY.

September 17. Mr. HILL gave an account of an experiment made with the ball and plummet, for the measuring of the depth of the sea, by Mr. BALLE; in which the society conceiving there was some mistake, Mr. HILL was desired to write to him again for a more particular and exact account.

* Register-book, vol. ii. p. 34.

Sir FRANCIS FANE, knight of the Bath, and CHRISTOPHER TERNE, M. D. were proposed as candidates by Mr. CROUNE.

Mr. CROUNE shewed the experiment recommended to him, of a bladder filled with water hung in the air, through all the pores of which was an exudation of water in small drops; a proof, that water will pass where air will not. The bladder was old and dried.

Mr. BOYLE was desired to communicate to the next meeting the experiment of two liquors, which by mixture immediately became a consistent body.

Dr. CHARLTON read his discourse, entitled *Apparatus Phonocampicus: or, what inquiries are principal'y to be made by such, who would attain to the certain knowledge of the nature of echoes*: which was ordered to be entered into the book of histories and theories¹.

The operator was ordered to provide a thick glass tube about six feet long, for trying the experiment of quicksilver and water together at the next meeting.

Dr. CHARLTON was desired to procure against the next meeting some of the Portugal-water; and Mr. HILL some of the water brought by the merchants from the Indies, to be compared with some of our water, with respect to their several weights.

A paper about the improvement and planting of timber, brought by Sir ROBERT MORAY from the commissioners of his majesty's navy, was read, and referred to the consideration of Mr. EVELYN, Dr. GODDARD, Dr. MERRET, and Mr. WINTHROP.

The president communicated a letter sent by his majesty to the duke of ORMONDE, lord lieutenant of Ireland, recommending the Royal Society for a liberal contribution from the adventurers and officers of Ireland, for the better encouragement of the said society in their designs. Whereupon it was ordered, that a copy of the said letter should be taken²; and the humble thanks of the society be returned to his majesty by Sir ROBERT MORAY, for this great testimony of his royal favour.

The president was desired to return likewise the thanks of the society to Mr. Secretary NICHOLAS and Mr. WILLIAMSON, for their readiness to assist the society in the king's letters to Ireland, without taking fees.

The experiment of breaking a wire, by weights hanging upon it, was tried.

Mr. WINDE, Dr. CUDWORTH, Dr. MORE, commissioner PETT, Mr. SCHROTER, Mr. HAYES, Sir JAMES SHAEN, and Mr. ISAAC BARROW, were put to the scrutiny, and elected.

¹ Register book, vol. i. p. 197. ² The copy of this letter was wanting in Mr. OLDENBURG's time, as appears from a note in his hand-writing upon a catalogue of the papers referred to in the first journal-book.

September

September 24. Sir JAMES SHAEN and Monsieur SCHROTER were admitted as fellows of the society.

Dr. GODDARD gave an account in writing of his experiments of weighing the mercurial glass canes; which was ordered to be registered^b.

He brought in likewise his thoughts concerning the planting of timber in England, upon the proposition offered to the consideration of the society by the commissioners of his majesty's navy.

Dr. ENT observed, that it was found by experience, that no oaks grow well but from acorns.

Mr. WINTHROP read his paper concerning the conveniency of building of ships in some of the northern parts of America; which was ordered to be registered^c, and was as follows:

" The honourable society may be pleased to consider, whether it may not be fit
" to propose to his majesty, or his honourable commissioners for the navy, the
" conveniency of building ships in some of the northern parts of America; there
" being several reasons, that may be propounded, as motives encouraging thereunto.

1. " That there is great store of good oak timber, fit for the building of ships,
" in many parts of that continent.

2. " There is great store of spruce and fir-trees, fit for masts of all sizes for
" ships of any burthen.

3. " There is store of that sort of pine, which is called pitch-pine; of which
" tar and pitch may be made.

4. " There are many saw-mills, for the sawing of plank and board of all sorts;
" so that there may be a sufficient quantity at all times provided, though there
" should be divers ships built at a time.

5. " In respect of the cheapness of timber, and by the help of those saw-mills,
" which are most of them upon or near good harbours and navigable rivers, plank
" will be much cheaper than it can be provided in England; possibly for a third
" or fourth part of the price.

6. " It is not a new project the building of shipping in those parts, for there hath
" been sufficient experience already made, there having been every year some built
" (great or small) for above these twenty years. There were this summer divers
" here at London, that were built there, whereof two of about two hundred tons:
" there is one now of an hundred tons in this river, that was built there: there

^b It does not appear in the register. ^c Register book, vol. i. p. 205.

" have.

" have been formerly some of three hundred and four hundred tuns built there.
 " There hath been also, and is daily, tar and pitch made; and much experience
 " hath been made of the masts of those parts; many having been brought over
 " hither and made use of.

7. " There may be yet farther trial made without much trouble, or unneceffary or hazardous charge, there being already very good artificers for master-workmen, and other ordinary workmen, for building of ships, known well to many here; also calkers, and smiths, and all other trades, necessary towards that work.

8. " When the ship is built, it may be presently freighted with planks, boards, knee-timber, or other timber, and trunnels, or with excellent masts; all which will be of good use for supply of building ships here.

9. " When it shall be thought fit to send over more workmen, there are houses may be hired or bought at reasonable prices, or other private lodgings, for their entertainment, in several parts of the country; and plenty of all sorts of provisions, for the supply of as many as it may be necessary to employ, to be bought at indifferent rates. Such things, as are necessary to be transported hence toward the business, are only rigging, sails, anchors, cables, and Spanish iron for spikes, bolts, &c. which is best to be here also ready made into bolts and other iron-work necessary. Though there be iron-works, and good iron made there, yet Spanish iron is most approved for that work."

Dr. CHARLTON brought some of the Portugal water; which was ordered to be kept till some water could also be procured from the East-Indies, that they might be compared with some of our waters, as to their weights.

Dr. GODDARD suggested, that it might be tried, whether the water carried over-sea in glass-vessels will putrefy, as it doth in wooden ones. The care of this experiment was recommended to Mr. HILL.

Dr. GODDARD was desired to try, at the next meeting, the experiment of quick-silver and water together in a glass cane of five or six feet long.

The experiment of breaking, by weight, a silver wire of $\frac{1}{4}$ of an inch diameter, was tried; but there being a defect in the apparatus, order was given to the operator to get it mended against the next meeting, that it might be then tried again.

October 1. FRANCIS WILLUGHBY, esq; was admitted member of the society.

Sir FRANCIS FANE was elected and admitted.

Mr. BOYLE shewed an experiment of two limpid liquors, which mixed together soon coagulated into a consistent body. He said, that one of the liquors was
 Vol. I. Q spirit

spirit of wine, the other no spirit. He was desired to prosecute his experiment about coagulation; as also those concerning the nature of colours.

Mr. WILLUGHBY shewed a snake's egg; which, being opened, a snake was taken out of it, with a kind of navel fastened to a piece of flesh like a placenta, and two little protuberant parts near its tail, taken by some for a *geminus penis*.

Upon this occasion it was remarked, that the difference between the brooding of snakes and that of vipers was, that the former lay their eggs in dunghills, by the heat of which they are brooded; but the latter brood their eggs within their bellies, and bring forth live vipers. A member of the society added, that he had seen a snake lie upon his eggs in the manner, that an hen sits upon hers.

Dr. WREN presented some cuts done by himself in a new way of etching; whereby, he said, he could almost as soon do a piece on a plate of brass, as another should draw it with a crayon upon paper.

Dr. MERRET read his paper concerning the planting and preserving of timber; together with his collection of those statutes, that have been formerly made by the parliament of England concerning the same.

Dr. ENT suggested, that sets of trees cut near the root, and then transplanted, will thrive very well, without observing their position as to north or south.

Dr. WREN observed, that the grafting of a root upon a tree, and so setting it within the ground, makes it thrive very well.

Mr. HILL was desired to procure, that some English water might be sent in glass bottles into the East-Indies, to see whether it would putrefy in glass as well as it does in wooden vessels.

Mr. EVELYN was desired to peruse the papers concerning the propagating of timber, brought in by Dr. GODDARD, Dr. MERRET, and Mr. WINTHROP, and to add what he had of his own, digesting the sum of all into one paper against the next meeting.

The experiment of breaking a silver wire of $\frac{1}{2}$ of an inch diameter being made, and the wire broken by the weight of 850 lb (whereof the scale, wherein the weight lay, was reckoned for 100 lb) it was ordered, that the operator provide, against the next meeting, a wire of $\frac{1}{4}$ of an inch diameter; and that the experiment be tried as well in iron and brass wires as in silver ones.

The experiment of lifting up bellows under water was made; and Dr. GODDARD, Dr. WHISTLER, and Dr. WREN, were desired to prosecute the same.

Dr. WILKINS proposed the experiment of sinking a lamp in a glass-vessel under water, to see how long it will burn there.

Dr.

Dr. WREN proposed the experiment of forcing up water in two pipes of different diameters and equal altitudes; but having both in the lower end equal bores, the water in the larger pipe would be forced out by less strength than that in the smaller pipe. He was desired to bring in a description of this experiment, and something by way of account concerning it, at the next meeting.

October 8. Mr. JAMES HAYES was admitted a member of the society.

Mr. PETTY proposed WILLIAM HOARE, M. D. as a candidate.

Dr. TERNE was put to the scrutiny, and unanimously elected.

Dr. GODDARD and Dr. WILKINS were appointed curators, for the experiment proposed at the last meeting, how long a lamp will continue to burn under water.

Mr. WILLUGHBY produced his demonstration to prove, that the same area of ground planted with trees after a quincuncial figure, will hold more trees placed at the same distance from one another, than the square, in the proportion of 8 to 7.

It was ordered, that the thanks of the society be given to Dr. MÉRRET, for his pains in translating the Italian discourse *De Arte Vitraria*, upon the motion and desire of the society: And

That Mr. WILDE be desired to communicate to the society such choice discourses, as he hath collected upon several subjects relating to experimental philosophy, that they may be perused and considered by several members of the society to be appointed for that purpose.

Mr. BOYLE was desired to shew, at the next meeting, the second part of his experiment about coagulation, viz. the reducing the coagulated liquors to their former fluidity.

It was debated and put to the question, whether the former order concerning admitting all persons of the degree of barons or above it, and all of his majesty's privy-council, upon their desire and subscription, without putting them to the scrutiny, should be continued and made a statute; and it passed in the affirmative, twenty one members and more being present.

Dr. WREN offered an experiment about the undulation of quicksilver in a crooked tube; which, he suggested, was, for the velocity of it, proportionable to the vibrations of a pendulum. He was desired to prosecute that experiment farther, and to give in an account of it.

The experiment of breaking wires was deferred till the next meeting.

Mr. OLDENBURG produced a letter, dated at Zurich, 17 Sept. 1662, giving an account of a new mixture of metals very useful for pistols and guns, highly esteemed

in Germany, extremely light, and not subject to rusting or breaking. The following extract of this letter was ordered to be entered in the letter-book ¹.

"Here is a goldsmith, called FELIX WARDER, citizen of Zurich, who hath the invention of a way to make hand-guns and pistols, of a metal, which is called *orichalcum*. None besides himself is known to have this invention; and he tells me, that at Nuremberg they have spent thousands in making experiments to find it out, but all in vain. He can make that brittle metal so tough, that it is a great deal freer from the danger of breaking than iron: besides, the pistols and guns made of it are so thin and so light, that they weigh scarcely half the weight of iron ones, and will bear a double charge, without ever breaking or cracking. The grandees have been presented with these guns frequently, and he sells the least of these pistols for six doubloons a pair; the larger sort, being gilt, for twelve doubloons or Spanish pistoles. I have discouraged with him about the preparing this metal: all I can learn of him is this, that he adds something to the *orichalcum*, which maketh it fusible and tough. And the barrels of his pistols and guns are all cast, and then prepared for use, when they are scowered within and without. I did ask him, whether he was not willing to teach the art to any? He said he was, though he had taught it nobody yet but his daughter, now dead, who was wont to help him to make them, when he had so much work, that he could not dispatch it all alone. I enquired further, what his price would be for teaching it? He said, if any, to whom he should teach, it would bind him to teach none else, his price would be 200 doubloons; but if it were left free to him to teach others, he would sell it for half that money. He added, that the invention could not be taught in writing, but that such, as would purchase it, must be present to see all themselves what is done, because that, besides the ingredients and the ordering of them, there is a certain flight, which if not seen and well observed, the work will miscarry."

October 15. Mr. WILLUGHBY produced a whiting's head, to shew, that there was a moveable skin over the eye, answerable to what Mr. HENSHAW shewed at the last meeting in a snake's skin, in which there were two little concave and convex glasses, in the place of the eyes cast off with the rest of the skin, affixed to it in the due place.

Sir ROBERT MORAY gave an account of his majesty's favour to the society, in declaring his pleasure, that no patent should pass for any philosophical or mechanical invention, but what was first put to the examination of the society.

He mentioned likewise a proposal likely to be speedily referred to them, of making iron with sea-coal. And having formerly been engaged himself in that experiment of making iron with sea-coal, he declared his judgment, that he conceived the attempt not feasible, on account, as he supposed, of the abundance of sulphur in the sea-coal, which destroys that quality in iron, which renders it tenacious.

The debate on this subject was adjourned till the person himself, who undertook the design, had made his trial.

Dr. HOARE was put to the scrutiny and elected.

Mr. EVELYN read his paper, in which he had put together the several suggestions offered by others in distinct papers, by way of answer to the queries of the commissioners of the navy; together with his own observations and apprehensions concerning the propagation of timber-trees; and he was desired to print the paper read by him¹.

The experiment of breaking wires was prosecuted, and referred to a farther trial; and Dr. GODDARD was desired to bring in an account of it to be registered.

Dr. GODDARD, Dr. MERRET, Mr. EVELYN, and Dr. WILKINS, were appointed a committee, to make an extract out of Mr. EVELYN's papers, and the others, &c. in order to return a brief and methodical answer to the queries of the commissioners of the navy.

October 22. Dr. CHARLTON produced the under-jaw of a pike of four feet two inches long, having every other tooth moveable, which he conceived was for more easy deglutition. He was desired to take notice of others, and to consider likewise the whole nature of swallowing. Upon this occasion he suggested, that those voracious animals which swallow others whole, do not kill them first, but swallow them alive; instancing in the cormorant, that never is seen to swallow any but live fishes; and in vipers, that swallow only live frogs or toads: and conjecturing, that the motion of the live creature makes it pass more easily. He suggested likewise, that no animal can swallow under water without being choaked.

Dr. TERNE was admitted fellow of the society.

Dr. MERRET mentioned, that live worms are sometimes found in the stomachs and guts of falcons. He was desired to make some observations in those and other fishes.

This gave occasion of discoursing upon what is called equivocal generation; and it was considered, whether all animals, as well vermin and insects as others, are produced by certain seminal principles, determined to bring forth such and no other kinds. Some of the members conceived, that where the animal itself does not immediately furnish the seed, there may be such seeds, or something analogous to them, dispersed through the air, and conveyed to such matter as is fit and disposed to ferment with it, for the production of this or that kind of animal. Others thought, that those *femina*, said to be carried in the air, would have their seminal virtue im-

¹ It was published by him under the title of, *as it was delivered in the Royal Society the 14th of October, 1662.* It has passed through five editions in folio, the last of which appeared in 1729.

paired, if not destroyed, by it. Sir ROBERT MORAY suggested, that something from without concurred to this kind of generation, since ships, when sheathed, are thereby secured from rotting and breeding of worms.

It was resolved, that farther inquiry should be made into this matter in due season; and that the several experiments should be tried, of putting blood, flesh, brains, &c. together in a glass or other proper vessel; as also bran and meal; and likewise cheese moistened with sack, &c. and that Dr. MERRET, Dr. GLISSON, and Dr. CHARLTON, should be desired to be curators of these experiments.

Dr. MERRET was desired to bring in his *Materia Vitraria*, mentioned in the book translated by him into English from Italian.

Dr. CHARLTON brought in his papers, in which he had reduced birds into certain families, in Latin and English; which papers were ordered to be kept; and the doctor was desired, in conjunction with Dr. MERRET, to reduce fishes into the like classes.

Mr. EVELYN was desired, against the next meeting, to make an extract of his discourse concerning the planting and propagating of trees, in answer to the queries of the commissioners of the navy: And

Mr. CROUNE to be curator of the experiments of breaking wires, and to have them exactly drawn against the next meeting.

The operator was appointed to provide for the experiment of the burning of a lamp under water at the next meeting.

He acquainted the society, that the bigger silver wire, which was of $\frac{1}{4}$ of an inch diameter, required the same weight to break it, when it was shorter by $1\frac{1}{2}$ foot than before.

Sir ROBERT MORAY communicated a letter written from Paris, concerning a new method to heal cut nerves, tendons, and other membranous parts, by sewing them together: as also a new way of curing hydroceles and hernias, preserving the testicles in their strength, and without obliging the patients to carry trusses.

October 29. Dr. WILKINS and Dr. GODDARD gave an account of the experiment, which had been made of a lamp burning under water in a vessel of four gallons, the elychnium being one single thread of cotton, and the lamp wholly under water: the flame lasted eleven minutes.

They were desired to repeat the experiment several times; as also to try it with some live creatures.

Dr.

Dr. CROONE * gave an account of a silver wire of $\frac{7}{8}$ of an inch, breaking by one hundred, one quarter, and an half quarter weight, besides the weight of the scale. He was desired to prosecute the experiment, and to bring in the several trials thereof.

Mr. ISAAC BARROW was admitted fellow.

Mr. COLWALL communicated a paper concerning the manner of ordering oil-sticks at Colchester; which was ordered to be filed up.

The proposition of making iron with sea-coal being mentioned again, Sir ROBERT MORAY added to what he had formerly said about it, that the undertaker pretended to do it without charring the sea-coal, and without a reverberating furnace, or any thing added to the coals; and that he thought, that the said undertaker would do it by a furnace of a certain figure, whereby the fire should be proportioned and regulated in such a manner, as to produce the effect intended, viz. good iron serving for all purposes.

There was also mentioned a way of making lead by sea-coal; the undertaker of which being said to be at Windsor, and known to the amanuensis, the latter was ordered to write to him about it.

Sir ROBERT MORAY offered to the consideration of the society a way to compare the effect of heat and cold in rarefaction and condensation of air, with that of force or weight. Upon which, Dr. GODDARD suggested DREBBEL's method of governing a furnace by a thermometer of quicksilver.

Dr. GODDARD proposed the third of his experiments, of weighing glass canes with the cylinder of mercury in them; which shewed, as he observed, that the tube and the quicksilver weighed as much, notwithstanding the pressure of the air, that should put them *in equilibrio*, as they would have done being weighed in a pair of scales apart. The lord viscount Brouncker was desired to give his thoughts upon it.

Dr. WILKINS was put in mind to prosecute his design of an *universal language*.

Mr. SCHROTER proposed the experiment of breaking a serpentine stone by a spider; which he was desired to shew at the next meeting.

The amanuensis was ordered to give Sir ROBERT MORAY a copy, both of the experiments and queries, formerly drawn up to be sent to the East-Indies.

Dr. WILKINS mentioned Mr. STREETE's proposition of the longitude; and it was referred to the consideration of the lord viscount Brouncker and Sir ROBERT MORAY, before it should be presented to his majesty.

* He was created doctor of physic at Cambridge, by the king's mandate, Oct. 7, 1662. Dr. WARD's Lives of the Professors of Gresham college, p. 320.

Sir ROBERT MORAY mentioned, that there were some considerable papers of Mr. HARRIOT and Dr. HARVEY, which might be retrieved. And it was ordered, that those of Mr. HARRIOT being in the possession of the earl of CLARENDON, lord high chancellor, should be inquired after by Mr. MATTHEW WREN, and those of Dr. HARVEY by Dr. ENT and Dr. SCARBURGH.

November 5. Commissioner PETT and Mr. WINDE were admitted fellows.

Dr. CROUNE was desired to give an account in writing, at the next meeting, of the experiments of wires.

Mr. HAAR intending a journey to Colchester, undertook to make farther inquiries about oysters, and in particular about their spawning, multiplication in their pits, dispersion of their spawn by the tides, &c.

A proposition was made by a person introduced by the amanuensis, of melting lead-ore with pit-coal, with less charge, and in a shorter time; yielding also a greater quantity of lead out of the ore than other methods do. It was thought proper, that he should state his proposition in writing, and confer with the lord viscount BOUNCKER and Sir ROBERT MORAY about it.

It was suggested, that Mr. POVEY might be desired to send to Damascus, about the method used there of making steel.

Mr. COLWALL moved, that the inquiry concerning the ebbing and flowing about the island of St. Helena might be recommended to some persons, who were going thither; and he was desired to send it as it was stated by Mr. ROOKE.

The lord viscount BOUNCKER brought in his solution of Dr. GODDARD's third mercurial experiment; and the amanuensis was ordered to draw the figure of it in great, against the next meeting.

Mr. EVELYN having conferred with commissioner PETT concerning the account, which he was to bring in, of the best method of planting and propagating timber-trees, was desired to hasten that part of it, which concerns the way of preparing acorns for planting.

Mr. POWLE's description of the whispering-place in the cathedral of Gloucester was brought in by Mr. OLDENBURG, and read; and the scheme of it was ordered to be drawn in great, against the next meeting; which Mr. WINDE undertook to do. The description was as follows*:

"The cathedral in Gloucester hath on either side the choir an isle, and at the upper end a very fine chapel, dedicated to the virgin Mary. Into this there is an entrance behind the high altar, under a spacious arch, and over the arch stands

* Original Register, vol. i. p. 31.

"another

“ another little chapel, or cell, consecrated to one of the apostles. The isles are divided by arches of stone into two stories : from the floor to the uppermost of these there is a narrow passage, leading behind the eastern window of the choir, and by the side of this little chapel to the same floor of the other isle. This passage or entry, so famous by the name of the whispering-place, contains in breadth about three foot, and in height $6\frac{1}{2}$, save only on the side adjoining to the little chapel, where it riseth to be eight foot and about four inches high : the figure of it is the half of an irregular polygon, neither sides nor angles corresponding to one another. It consists wholly of free stone, the roof being covered with a flat stone of the same breadth with the floor, but so unevenly wrought, that I have seldom observed worse masonry in the same materials. It receives light from three little windows (each about fourteen inches square) in the roof, and from a door, and thirteen windows, which open into the chapel, formerly glazed whilst the church was in good repair ; but now standing open, without any other furniture than the iron-bars. Besides these apertures, there is a little door into a pair of stairs, which carry you to the top of the Virgin Mary's chapel ; but because it is constantly kept shut, I shall mention it no further, but refer you to the consideration of the figures.

“ That which is so much admired in this place, is the conveyance of the voice ; every soft and gentle whisper being as distinctly heard the whole length of the passage, which is near twenty yards, as if you had applied your ear close to the mouth of the speaker. It is usual with such as keep the cathedral, when they bring strangers hither, to place two persons, one at each end, bidding them to apply their mouths and ears alternately close to the inner wall, and so discourse together ; and in this manner the voice seems to me to be best conveyed : but upon the exactest trials I could make, I found, that whether you laid your mouth to the inner or the outer wall, or whether you spoke in the middle of the passage, there was so little difference, that it required a very accurate observation to distinguish any at all ; and as little alteration could I find, by changing the place of the stature ; for neither by coming nearer together could I perceive the voice magnified, nor by retiring to a greater distance (so I kept within the skirts of the passage) could I find it at all diminish. And this is all I could observe considerable, more than that an antient sexton told me, that he remembered, that, when the windows into the chapel had glass, the voice was heard more clear and shrill than since they stood open.

“ At what time, and for what purpose this place was built, there are no records now extant in the church, that can determine ; but it is a tradition generally received, that it was contrived by the monks to abuse the devotion of the more credulous sort of people, who being trained hither to confession, were overheard by some of their confederates, they afterwards persuading these simple penitents, that they came to the knowledge of their sins by divine revelation. Yet upon serious view of the place, I am more inclined to believe, that this effect was merely casual, and it was originally intended only as a passage from one isle to the other, without descending into the body of the church, which is a great way about ;

Vol. I. R “ and

“ and cast into this compass-figure, that it might not prejudice the sight of the
 “ eastern window of the choir, which is one of the fairest and largest that I have
 “ seen.

“ I shall now conclude with a short account of the causes of this effect, which I
 “ conceive to proceed merely from the closeness of the passage, the voice being
 “ carried here, as in a hollow pipe or trunk : for sound being, as I apprehend,
 “ nothing else but a motion or undulation of the air, propagated orbicularly from
 “ the concurrence or collision of two bodies, as from a center, in the same manner as
 “ we see little waves spread themselves on the superficies of the water when a stone
 “ is cast into it ; it must follow, that in the open air, where the voice hath room to
 “ dilate, the further progress it maketh, the more weak it must grow, every little
 “ wave or circle moving one greater than itself ; which it cannot do without dimi-
 “ nution of its strength and vigour : whereas the voice being confined in small
 “ channels, whether they are strait or crooked, may be continued to an infinite dis-
 “ tance ; because each circle moving another, no bigger than itself, may give it
 “ an impression of equal force ; as may be seen in the fourth figure here annexed,
 “ where A represents the original of the sound, B C D E, &c. the circles proceed-
 “ ing from it, which in the open air increase so fast, as that the motion either sud-
 “ denly vanisheth, or at least becomes imperceptible to the organs of the sense :
 “ which happens otherwise where the voice is contracted into a narrow space, as
 “ may appear in fig. 5, 6, 7. where the circles B C D E not having liberty to spread
 “ as in the open air, preserve the voice entire all the way it passeth through those
 “ close tunnels : And to this cause I attribute the conveyance of the voice in this
 “ passage, so great a space ; for the walls consisting of hard and solid stone, and
 “ not penetrable by sound, do not suffer the undulation of the air to expatiate or
 “ grow wider, by which means the voice is carried through it in an equal tenor.

“ And if any man shall object, that the voice cannot be carried here as in a pipe,
 “ in respect there are so many doors and windows in this passage, out of which,
 “ as out of so many gaps, the sound would escape ; I answer, that in those, which
 “ are kept glazed and shut, there can be little or no inconvenience : and for the
 “ other, it is a cause, no doubt, as was formerly observed, of impairing the sound,
 “ though not enough totally to debilitate it, because the greatest part of the passage
 “ is close. Besides, the voice returned at the angles of the passage, before it meets
 “ with these apertures, proceeds in a direct line from R to S, and there, by the re-
 “ sistance of the inner wall, is hindered from expatiating itself that way at all ; and
 “ therefore can only spread itself sideways towards the little chapel, by which means
 “ there is much less lost than if the course of the sound were directly against these
 “ open places. And I am the more confirmed in this opinion, because the learned
 “ KIRCHER relates, that the governors of the Roman aqueducts have assured him,
 “ that in some of them, near as capacious as ours, a whisper hath been heard
 “ five hundred foot, which is about eight times as far again as here ; the measure
 “ of the Italians little differing from the English. And I can see no reason, if it
 “ may be heard in them so great a distance, but that it may be carried here for
 “ such a space, though with some disadvantages.

“ But

" But these are only my present apprehensions, which I shall submit to the censure
 " of better judgments, in which though I am mistaken, I shall think my labour
 " well bestowed, if this weak undertaking may give an occasion to some person of
 " greater ability to discover the truth.

" Fig. 1. A, part of the choir.

" B C, the two isles of the sides of the choir.

" D F E, the eastern window of the choir.

" D G E T N S V, the passage or whispering place.

" H I, the little chapel or cell.

" M N O, the three little windows in the roof.

" P, the door into the stairs, which go to the top of the Virgin Mary's
 " chapel.

" K L, the side between the passage and the chapel, in which are thirteen
 " windows and a door into the chapel, all standing open.

" R S, the places, where the roof riseth from six foot three inches to be
 " eight foot four inches high.

" Fig. 2. A, the profile of the passage from D to R, and from S to E.

" B, the profile of the passage between R and S."

Sir ROBERT MORAY, Mr. EVELYN, and Mr. HOSKINS were desired to bring in writing to the next meeting the account of echos related by them.

Dr. CROUNE mentioned a way proposed by Mr. STAHL of destroying gold irrecoverably; and was desired to inform himself more particularly.

Dr. MERRET shewed his *Materia Vitruvia*; and was desired to leave a part of each of the materials with the society.

Mr. HAAK proposed a compendious way of repertory, and was desired to communicate it to the society.

Sir ROBERT MORAY proposed a person willing to be employed as a curator by the society, and offering to furnish them every day, on which they met, with three or four considerable experiments, and expecting no recompence till the society should get a stock enabling them to give it.

The proposition was received unanimously, Mr. ROBERT HOOKE being named to be the person.

November 12. Mr. COLWALL undertook to send Mr. ROOKE's inquiries about tides and winds to St. HELENA; and was desired to add his own.

The lord viscount Brouncker's solution of Dr. Goddard's third experiment was read, and found satisfactory, and ordered to be registered*. It was as follows:

"Because the air incumbent upon A is equal in weight to the cylinder of quicksilver BC, therefore the quicksilver keeps at that altitude above A B. Now because the whole cane and quicksilver A B C D is hanging at D, and because the cylinder of BC is counterbalanced by the air upon A, therefore at D is the weight of the whole cane, quicksilver, and air. But air in air in this sense weigheth not, for the air under hath a compressure equal to the weight of all above, and therefore impedes the descent thereof: therefore the weight at D or F is the just weight of the whole cane and quicksilver."

Sir Robert Moray was desired to bring in writing his account of the echo in Scotland.

Dr. Charlton promised to provide a pike against the meeting for dinner, in order to shew every second tooth moveable.

Sir Robert Moray proposed Mr. Hooke as a curator of experiments to the society; who being unanimously accepted of, it was ordered, that Mr. Boyle should have the thanks of the society for dispensing with him for their use; and that Mr. Hooke should come and sit amongst them, and both bring in every day of the meeting three or four experiments of his own, and take care of such others, as should be mentioned to him by the society.

The lord viscount Brouncker moved, that the experiments concerning the measure of the first velocity of bodies might be prosecuted, viz. what force is required to raise, for instance, one pound weight one yard high in one second of time. His lordship was desired to be curator of that experiment.

Sir Robert Moray proposed the trial, what proportion the velocity of a falling weight hath to that of a pendulum of a certain length: and he was desired to be curator of it.

Sir William Petty's letter to the lord viscount Brouncker concerning his double bottomed cylindrical vessel, was read, and ordered to be registered[†]; and he was desired to prosecute this invention, and to give farther notice of the success thereof upon the trial of the vessel at sea.

Mr. Graunt was desired to give in an extract of Sir William Petty's letter to him posterior to the former on the same subject.

Mr. Streete's proposition about the longitude was read; and referred to the consideration of the lord viscount Brouncker and Sir Robert Moray.

* Register-book, vol. i. p. 196.

† It does not appear in the register or letter-book: M²

Mr. BERCHENSHAW's paper on music was presented by Dr. CHARLTON; and the lord viscount Brouncker was desired to examine it.

Dr. WILKINS and Dr. GODDARD were reminded to prosecute the experiment of burning lamps under water, and to try it as well with spirit of wine as with oil.

Sir EDWARD BYSSHE and GEORGE SMITH, M.D. were proposed as candidates by Dr. WILKINS, and JOHN DRYDEN, esq; by Dr. CHARLTON.

November 19. Dr. GODDARD made the experiment of quicksilver and water together in a glass cane of $6\frac{1}{2}$ foot long; the cylinder of quicksilver being about $26\frac{1}{2}$ inches, and the rest filled up with water. Inverted into the stagnant mercury, the cylinder of quicksilver subsided to $21\frac{1}{2}$ inches, and the water near $47\frac{1}{2}$ inches, and about three inches of air on the top of the water: which seems to overthrow the proportion of the weight between quicksilver and water, stated by some to be as one to near fourteen.

Dr. GODDARD was desired to prosecute this experiment in conjunction with Sir ROBERT MORAY and Dr. WILKINS.

Mr. HOOKE made the experiment of breaking several glass bubbles with rarefied air, and nipt up; of which some broke with a brisk noise, others not. He was desired to bring an account in writing^a of this experiment to the next meeting; as also to make the experiment of weighing the same glasses, first with the rarefied air, and afterwards with the common air admitted into them, when unsealed.

He undertook to shew an experiment about the tenacity of air; and acquainted the society with an engine, which he had, for trying many experiments of condensation; which engine was desired to be made as soon as might be.

Dr. CROUNE acquainted the society with a letter, which he had received from Dr. POWER, who promised in it to send shortly an account of those subterraneous experiments formerly recommended to him.

Sir EDWARD BYSSHE, Dr. SMITH, and Mr. DRYDEN were elected into the society.

Mr. COLWALL brought in some inquiries for the East-Indies^b, to be added to those, that were formerly offered by others for these parts: and it was desired, that as many of the society as had any more queries proper to be sent thither, would prepare them against the next meeting.

Dr. CHARLTON was desired to bring in an account of his observations upon the teeth of pikes, and upon those of the *Rana piscatrix*: And

^a It is printed in his *Philosophical experiments and observations*, published by W. DEANHAM, F. R. S. p. 9-13. Edit. London 1726. 8vo.

^b See Register-book, vol. I. p. 212. and Dr. SRAAT's History of the Royal Society, p. 158.

Mr. GRAUNT to communicate an extract of Sir WILLIAM PETTY's letter concerning the new fashioned ship, together with a model of it, at the next meeting.

The lord viscount Brouncker gave his thoughts upon Mr. BERCHENSHAW's paper on music, objecting, that he made a half note bigger than a whole note, and every half note of a differing quantity, &c.

Dr. WILKINS being called upon for a farther account of his experiments of making lamps burn under water, promised to give it in at the next meeting, and to add what he had lately tried about a way-wifer.

It was moved by Sir ROBERT MORAY, that a syphon with a cock might be added to the vessel for the burning lamps under water, to let in the air towards the continuance of the burning.

Dr. CHARLTON gave an account of making the powder for embalming birds, and preserving them and their feathers to the life. He was desired to communicate in writing the whole process, according to the relation made by him. This process, as registered^{*}, was as follows :

Pulvis condiendis avium cadaveribus utilisissimus.

“ Pulveris, quo ad avium cadavera condienda, earumque plumas tanto colorum nitore, ut influxu vitali continuò illustratas crederes, diutissimè conservandas hodiè utitur generosissimus juxta ac ingeniosissimus vir, dominus JOHANNES CREWE, formula talis est.

“ R Myrrhe, benzoini, styracis calamitæ, caryophyllorum, & cinnamoni, aa ʒj.
“ calami aromatici & sulphuris vivi aa ʒß. fantali albi ʒijj. campboræ ʒj.

“ Fiat omnium pulvis, qui spiritu vini optimo in pastam reducendus, & exten-
“ teratis cadaverum cavitatibus dextrè inferciendus.”

Dr. SMITH was desired to procure the observations made by his brother concerning cyder :

Sir PAUL NEILE to communicate his observations on the same liquor : And

Dr. CHARLTON and Dr. MERRET to bring in their observations upon the preserving of several of the more delicate sorts of wine, such as Champagne, Florence, Frontignac, &c.

Mr. MATTHEW WREN acquainted the society, that the lord chancellor, upon the intimation of their desire, had expressed his readiness to communicate to them several papers of Mr. HARRIOT, which he had in his custody ; and that he would give Mr. WREN access to his trunks for them.

^{*} Original Register, vol. ii. p. 41.

Mr. HAAK made a relation of what he had learned concerning oysters at Colchester, and was desired to give it in writing at the next meeting.

Col. TUKE promised to bring in likewise an account of the same subject.

A hint was given, that the position of oysters, and a certain quality of the ground, together with the salt, are the cause of their greenness: And

That oysters are good to be eaten after some days of dry weather following upon much wet.

Farther inquiries were ordered to be made, whether the spawn of oysters ever swims.

Mr. HAAK shewed the society a specimen of his repertory.

Dr. CROUNE's account of the experiment of breaking wire was referred to the next meeting.

November 26. Mr. DRYDEN was admitted.

The lord viscount BOUNCKER acquainted the society with the approach of St. Andrew's day; and that by reason of the necessity of making some alterations in their charter, there could not be conveniently made an election of new council this year: but it was offered to the society, whether they would propose some other persons to be presented to the king, and, according to his majesty's pleasure, to be put into the council of the altered patent, instead of some of those, who were in the first.

Upon which it was put to the question, whether in case any such alteration of the members of the council should be made, it should be done by ballot, or open vote; and it was carried for the latter.

After which it was put to the question, whether any alteration should be made in the council, or not? and it was carried in the negative.

Mr. HOOKE brought in his account of the experiments tried with glass-balls: 1. Of driving out the air by heat only. 2. Of driving it out by vapours. 3. Of their breaking of themselves. 4. Of their breaking by a knock. 5. Of the quantity of water they admitted. 6. Of the weight of the air admitted. 7. Of their shrinking and stretching. 8. Of their breaking outwards; which was read, and was as follows:

"A small tube of white glass melted in the flame of a lamp was blown into a pretty large ball (near the size of a tennis-ball) the small neck or pipe of which being, whilst the ball was yet red hot, suddenly and carefully sealed up hermetically

¹ Original Register, vol. ii. p. 37.

"cally;

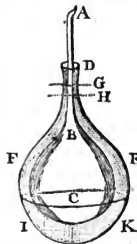
“ cally ; I observed, that these balls or bubbles being left to cool, some of them, that were either not very equally or over thin blown, would in the cooling break inward with a brisk and loud noise ; some sooner, whilst yet hot ; others later, when even quite cold ; but these later yielded much the louder report. Some, that were strong and even blown, remained entire when quite cold ; the which balls I observed to endure a much greater and more violent blow before they would break, than others much of the same make, which were left to cool without sealing up. But when with a pretty brisk blow they were broken, they yielded, besides the noise of the blow, sometimes a smart, at other times a more faint noise : some of these bubbles, whilst thus hermetically sealed, being poised in a pair of exact scales, and the title sealed and nipt off and put into the same scale, a sibilus or hissing noise might very easily be heard to ensue, for the short space of about half a second of time ; after which the same scales and counterpoise being left free, the bubbles were always observed to preponderate, some by $\frac{1}{4}$ of a grain, others half, and others more. The ends of some other of these being broken off under the water, the water was observed to ascend with a very great impetuosity, and when within the ball, to look white, until such time as it had filled the bubble or ball about $\frac{2}{3}$ or $\frac{3}{4}$ of the whole capacity ; some more, some less, according as the balls were more or less hot when sealed up. Holding the balls of some of these unsealed bubbles over the flame of a candle, till the water was boiled or exhaled away (rushing out very impetuously through the small stem) I immediately sealed up the small end again, and observed some of them to break with a much louder crack than those, that had been sealed up when red hot. One, that had a very small passage through the neck, being kept too hot in the flame, burst outward with a very great violence and noise : breaking off the tips of others under water, I found a much greater quantity of water to enter, in so much as to fill almost the whole ball, leaving a very little bubble of air at the top. Others that I weighed I found to increase more in weight by the admission of air, than they had done before the other sealing.

“ After this, having emptied out the water, I put into some of them a small quantity of indifferently well rectified spirit of wine, and holding the ball over the flame of a lamp, till the spirit with great impetuosity was evaporated and driven out (which I presently perceived, by the ceasing of the vapours at the tip) I sealed up the tip, and proceeding as with those I tried with water, I found these to differ very little from those, both as to the noise they yielded, and in their admitting of water : and as to the weight of the air, both these two last ways I found to differ from the first, in this, that whereas the red hot glasses, when cold, were clear, these, though they appeared clear when hot, were notwithstanding all tarnished over with a kind of dew in the insides when cold ; which dew would quickly disappear, if they were again heated pretty hot. There were several other circumstances, which because they will be more notable in other experiments, I here omit.”

A conjecture at the causes.

“ That the elastical power first of the exceedingly heated parts of the air, that are within the ball of the glass, when red hot, being very much intended, a very
“ small

“ small parcel is able to prefs and keep out all the rest of the ambient contending
 “ atmosphere; even as in the next place a small parcel of water, or spirit of wine,
 “ rarefied into vapours by a not very strong heat, is likewise able to do. Now
 “ whilst the air is thus thrust and kept out, the passage being firmly shur, the am-
 “ biant air is hindred from rushing in that way, though the heat within the ball
 “ decreasing, and so likewise the elater both of the air and vapour (the latter for
 “ the most part returning or falling back into their pristine forms of water or spi-
 “ rit of wine, and so sticking about the insides of the bubbles) would not have
 “ been able to have hindred its rushing in. Now the pressure of the included
 “ body against the insides of the glafs (whether air or vapours: decreasing with its
 “ elater, and that with the heat, and the pressure of the ambient remaining the
 “ same, that curious arched vault of the glafs is forcibly pressed and crushed toge-
 “ ther, and so the particles are put into a closer texture. Now the difference of
 “ the internal and external pressure increasing by the decrease of the included air's
 “ elater, if some parts of this arch (if I may so call it) be weaker than the rest, or
 “ irregular, the ambient pressure breaks it in; even as in architecture, the same
 “ would happen in those larger vaults, if in either of these particulars they deviate
 “ from the rules of that art. But if they be sufficiently strong and equal, the am-
 “ biant pressure makes the crystalline vault the firmer, as in arches of stone is com-
 “ monly observed. Now that the parts of glafs are pressed closer together, I
 “ found by this experiment: I fitted a pretty large bubble with a slender neck



“ (such as A B C in the figure) into a bolt-head D E F,
 “ whose neck D was drawn very small, and only left
 “ big enough to contain the neck A B of the bubble,
 “ and whose bottom I K was cut off, that thereby the
 “ the ball might be included. Having thus fitted the
 “ ball into the bolt-head, I shut on the bottom again
 “ with cement, and filling up the space left in the bolt-
 “ head with water, till it reached into the small of the
 “ neck as high as H; I nipt off the sealed top of the
 “ bubble A, whereupon the water in the small neck rose
 “ about $\frac{1}{4}$ of an inch from H to G, which could proceed
 “ from nothing else than the relaxation or return of the
 “ compressed parts of the included ball, to its former di-
 “ mensions and positions they were left in before the
 “ ball was sealed up; which, by the way, affords an in-
 “ stance of compression, wherein that so hard and ex-
 “ actly uniform body of glafs is compressed into less

“ room, and that by no greater pressure than that of the incumbent atmosphere;
 “ which, when most with us in England, is no more than the pressure of quick-
 “ silver thirty inches thick or high; a very good argument, that other bodies
 “ which are not so uniform and hard, are not without many interstices or pores:
 “ and whether water and other fluid bodies may not suffer the like compression,
 “ trial will inform. The cause of the noise I dare not yet determine, but I think
 “ it worth a further inquiry, whether it proceed not from the impetus, wherewith the
 “ broken pieces of glafs are dashed against one another, though the noise seem of
 “ another kind; or, adly, from the sudden rushing of all the parts of the ambient
 “ air

" air towards the middle of the ball, whereby all the other parts of the circumambient air being likewise moved towards the same middle, each hinder part succeedeth into the space deserted by the former, till the air within the drum of the ear endeavouring to succeed into the place of that without, may thereby move the film, and so cause the sound to be heard; or, 3dly, which seems to be most plausible, from the sudden and violent rushing toward the center, and (by there meeting each other, or at least the broken pieces of glafs) as sudden and violent recoil: one of which two last (if not a 4th, namely, the sudden flying out of the air) seems to be the reason of the noise of a discharged shot of powder. The alteration, as to weight, does clearly enough proceed from the admitted parts of the air, whose admission the hissing noise plainly speaks: a manifest experiment, that air doth gravitate in air. The violent rushing in of the water argues the forcible pressure of the external, as the multitude of bubbles do the languid resistance of the included air.

" The experiments suggest these queries :

1. " By what means heat rarefies and expands bodies ?
2. " The strength of a knock, or the force of falling bodies ?
3. " What may be the cause of noise or sound ?
4. " Whether the causes of the almost similar phenomena of the glafs drops may not be deduced from these principles ? or what may be their causes ?
5. " What is the weight of air in winter ?"

This paper was ordered to be considered at the next meeting, and the author desired to shew then the several experiments mentioned in it, and to have ready a scheme in great of the glafs vessels, by which he endeavoured to prove, that the parts of glais were pressed close together.

He was desired likewise to think upon some experiments of freezing.

Mr. HENSHAW was also put in mind of the experiments of freezing, mentioned by him formerly to the society.

Dr. CROUNE brought in Dr. POWER's subterraneous experiments, which were ordered to be read at the next meeting, and the amanuensis to draw large schemes thereof.

Sir ROBERT MORAY's letter to Sir PHILIBERTO VERNATTI, in Java in the East-Indies, recommending to him the queries of the society, was read, and it was ordered, that a copy of it be kept, and that the queries should be made ready with all speed, with an insertion in them of those presented this day by Mr. COLWALL, Mr. HOSKYNs, and Mr. HAAK, and of that mentioned by Dr. ENT concerning the spring-tides falling out at the quarter moons in the East-Indies.

* It is entered into the letter-book, vol. i. p. 67. and was dated at Whitehall November 24, 1662.

Dr.

Dr. CHARLTON being called upon for his account of the pike's moveable teeth, and he desiring to have the bringing of it in deferred till the next meeting, Dr. ENT mentioned another fish having two rows of teeth, of which the innermost are all moveable.

Sir WILLIAM PETTY's second letter to the lord viscount Brouncker was read, giving a farther account of his new ship; as also an extract of another letter of his to Mr. GRAUNT, who was desired to let Sir WILLIAM know, that the society was well pleased with the invention:

And it was farther ordered, that those members, who were in Ireland, or any three of them, should be desired by the president, in the name of the society, to send them an account of this new ship, both as to her structure and sailing.

Dr. WILKINS brought some farther account of the lamps burning under water in the midst of the glass-vessel; and was desired to prosecute the same, and to bring in the whole in writing.

He shewed his way-wifer, and the effects thereof upon a coach; and was desired to leave his first engine of this kind with the society.

Dr. SMITH's paper concerning cider was read, and ordered to be registered*: it was as follows:

"The best time to grind the apples is immediately from the tree, so soon as they are thoroughly ripe; for so they will yield the greater quantity of liquor, the cider will drink the better, and last longer, than if the apples were hoarded: for cider made of hoarded apples will always retain an unpleasant taste of the apple, especially if they contract any rottenness.

"The cider, that is ground in a stone cask, is generally accused to taste unpleasantly of the rinds, stems and kernels of the apples; which it will not, if ground in a cask of wood, which doth not bruise them so much.

"So soon as the cider is made, put it into the vessel (leaving it about the space of one gallon empty) and presently stop it up very close: This way is observed to keep it longer, and preserve its spirits better, than the usual way of filling the vessel quite full, and keeping it open till it hath done fermenting.

"Cider put into a new vessel will often taste of the wood, if it be pierced early; but the same stopped up again, and reserved till the latter end of the year, will free itself of that taste.

"If the cider by sharp and thick, it will recover itself again; but if sharp and clear, it will not.

* Register book, vol. i p. 207.

“ About March (or when the cider begins to sparkle in the glafs) before it be too fine, is the best time to bottle it.

“ Cider will be much longer in clearing in a mild and moist, than in a cold and dry winter.

“ To every hoghead of cider designed for two years keeping, it is requisite to add (about March the first year) a quart of wheat unground.

“ The best fruit (with us in Gloucestershire) for the first year's cider are the red-streak, the white and red must apples, the sweet and four pippin, and the Harvey apple.

“ Pear-mains alone make but a small liquor, and hardly clearing of itself; but mixed either with sweet or four pippins, it becomes very brisk and clear.

“ Must-apple cider (though the first made) is almost the last ripe, by reason that most of the pulp of the apple passing the strainer in pressing makes it exceeding thick.

“ The cider of the Bramsburrow crab, and Toxwhelp is not fit for drinking till the second year, but then very good.

“ The cider of the Bramsburrow crab yields a far greater proportion of spirits in distillation, than any of the others.

“ Crabs and pears mixed, make a very pleasant liquor, and much sooner ripe than pears alone.”

Several other papers were brought in, viz. of Sir ROBERT MORAY concerning an echo in Scotland, and of Mr. HAAK concerning oysters; as also Mr. WINDE's larger scheme of the whispering place in the cathedral of Gloucester, according to Mr. POWLE's description formerly sent to the society: all which were ordered to be read at the next meeting.

Dr. ENT promised to communicate some remarks upon oysters.

Dr. CHARLTON delivered in his observations upon wines, which were ordered to be kept; or, if he took them home, he was desired to bring them again at the next meeting.

December 3. Mr. HENSHAW read his experiments of freezing, and was desired to add more to them, and to bring them against the next meeting.

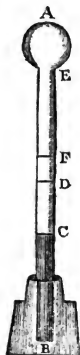
Dr. WILKINS suggested an experiment of putting water freed from air into Mr. BOYLE's engine, and to let it freeze there, in order to see whether it will not be a clear ice.

Dr.

Dr. WHISTLER suggested, that the freezing of salt-water renders it fresh : and Mr. HILL confirmed this, by alledging, that the people of Amsterdam use frozen sea-water for brewing.

Dr. POWER's paper of subterraneous experiments, and observations made of the dampings of coal-mines, were read, and afterwards registered; and were as follow^s :

EXPERIMENT 1.



" At the top of the coal-pit, we took the weather-glass A B, whose shank E B was about $2\frac{1}{2}$ foot long, of a small bore, and the head A E $2\frac{1}{4}$ inches in diameter; and heating the head thereof, and emerging it presently in the glass full of water B, the water, after a competent time, rose up to the point C, where we let it stand for a while, till we saw, that the external and internal air were come to the same temper and elasticity: then carrying the weather-glass (so prepared) in a scoop, down to to the bottom of the coal-pit (which was not above 35 yards deep) there the water in the weather-glass did rise up to the point D, viz. very near three inches higher than its firm standard C.

EXPERIMENT 2.

" The 6th day of November, 1662, we repeated the same experiment as before, in a pit of 68 yards deep, and there we found, that at the bottom of the said pit, the water in the weather-glass did rise very near four inches higher than the point C, viz. one inch higher than the point D, to F: now we observed, that, in carrying down of the said glass in a scoop, from the top to the middle of the pit, then the water did not rise so much as it did from the middle to the bottom, by half an inch: so that, it seems, the rise of the water was not proportional to the glass's descent in the pit.

EXPERIMENT 3.

" We took a very good armed loadstone, of an oval figure (whose poles lay in the long diameter) and, at the top of the coal-pit, we loaded the strong pole, which is the north-pole, with the greatest weight it was able to carry, even to a scruple: then taking the stone down to the bottom of the pit, and having on the same weight again to the same pole, we could perceive no difference in the power of the stone at the one place from the other; for it would neither lift more nor less than above: though to try this experiment precisely, and to minute weights, is very ticklish; for the same stone, in any place, will sometimes lift a little more, and sometimes a little less.

EXPERIMENT 4.

" We took a thread of 68 yards long (which is as long as the deepest pit is with us) and fixing a brass lump of an exact pound weight to it, we counter-

^s Original Register-book, vol. ii. p. 45.

“ poised both it and the thread with a weight in the other scale ; then fastening
 “ the other end of the thread to one of the scales, we let down the pendent weight
 “ near to the bottom, and there we found it to weigh lighter, by an ounce at least,
 “ than it did at the top of the same pit.

“ We had tried this with a bladder full of water, and other substances also ;
 “ but that our thread, by often turning, broke itself.

EXPERIMENT 5.

“ The colliers tell us, that if a pistol be shot off in a head remote from the
 “ eye of the pit, it will give but a little report, or rather a sudden thump, like
 “ a gun shot off at a great distance ; but, if it be discharged at the eye of the pit
 “ in the bottom, it will make a greater noise than if shot off above-ground. But
 “ these experiments are of a dangerous trial in any pits, and the colliers dare not
 “ attempt them, by reason of the the craziness of the roof of their works, which
 “ often falls in of its own accord, without any concussion at all.

Of the ordering of Coal-pits.

“ Every coal-pit hath its vent-pit, digged down at a competent distance from
 “ it, as 50 or 80 paces one from another. They dig a vault under ground, from
 “ one pit to another, which they call the vent-head, that the air may have a free
 “ passage from one pit to the other. Now the air always has a motion, and runs
 “ in a stream from one pit to the other ; for if the air should have no motion
 “ (or vent as they call it) but restagnate, then they could not work in the pits.
 “ It is not requisite, that the vent-pit should be as deep as the coal-pit. Now
 “ the vent, or current of subterraneous air, is sometimes one way, and sometimes
 “ another ; sometimes from the vent pit to the coal-pit, and sometimes contrari-
 “ wise, as the winds above ground do alter ; and also weaker and stronger at some
 “ times than at other ; and sometimes the vent plays so weakly, that they cannot
 “ work for want of ventilation. Then, to gather vent (as they call it) they
 “ straiten the vault, and wall part of it up ; so that the air, which before ran in
 “ a large stream, being now crowded into a lesser channel, and forced to pass
 “ through a narrower room, gathers in strength, and runs more swiftly. Now
 “ it is observed, that the subterraneous air is always warm, and in the coldest
 “ weather, the warmest ; so that it never freezes in the pit out of which the vent
 “ plays.

Of Damps, by the same.

“ There are three sorts of damps ; or rather, three degrees of the same damp ;
 “ viz.

“ The { Common,
 Suffocating,
 Fiercy.

“ The common damp is that subterraneous stream, or exhalation, which com-
 “ ing out of the earth, restagnates in the heads and under-ground cavities, and
 “ hinders

“ hinders their candles from burning, so that they cannot work. 1st, If they
 “ incline their candle downward toward their seat, it is observed it will abide in
 “ the longer, and not sweat away, and stifle itself with too much tallow, as it
 “ would do above-ground. 2dly, I though the damp be so great, that it extin-
 “ guisheth the candles, yet they can abide in it without suffocation. 3dly, This
 “ damp is sometimes generated by the effluvioms and perspirations, that come out
 “ of their own bodies, that work, if they sweat much; and if the candle be with-
 “ in the sphere of those effluvioms, it will extinguish it as the former; as the col-
 “ liers observe, that pass from one head to another man, that is working in another
 “ head. This damp is sometimes on the one side of the heads, and not on the
 “ other; and for the most part it runs all along the roof; so that a candle will
 “ burn, if set upon the seat; but if you lift it up into the superincumbent region
 “ of damp vapours, it will be immediately extinguished. Now besides the play-
 “ ing of the vent, they sometimes are necessitated to keep constant fires under-
 “ ground, to purify and ventilate the air: sometimes the running of the scoops,
 “ when they begin to work, will set it in motion; sometimes, if the damp draw
 “ towards the eye of the pit, they set it into motion, by throwing down of coal-
 “ sacks: else the heavy vapour will reſtagnate there, and is not able to riſe.

Of the Suffocating Damp.

“ The ſuffocating or choaking damp is a more pernicious exhalation; or else
 “ a higher degree of the former, into which no man is able to enter, but pre-
 “ ſently he is ſtified, and dies. And it is obſerved, that the bodies of thoſe,
 “ which are ſo ſlain, do ſwell, and are puſſed up exceedingly, as if poiſoned.
 “ This damp is ſeldom here in our pits; but, if it be, the firſt perſon, that is let
 “ down into it, is preſently killed: ſo that afterwards they try, by letting down
 “ of dogs, when it is removed, and fit to enter into; and moſt part, by letting
 “ down of lighted candles, which will be extinguished by the damp at the bottom
 “ of the pit, if any damp be reſtagnate there.

Of the Fiery Damp.

“ The fiery damp is of all others the moſt dangerous, but is never ſeen in our
 “ pits. At Leeds, which is not above twelve miles off, as alſo in Lancaſhire-
 “ pits, and Newcaſtle-pits, I have heard much of it. It is a vapour, or exhalation,
 “ which comes out of the mineral, or out of the clefts in the mineral; and it
 “ ſometimes comes out fired, and ſometimes in the form of a ſmoke; which after-
 “ wards fires of its own accord, and then forces its way with that vehemency and
 “ activity, that it drives all before it, and kills without mercy, inſomuch that I
 “ have heard, not many years ago, three men in Newcaſtle-pits were ſo ſhattered
 “ with it, that their very limbs were ſevered with it.

“ This fiery meteor is obſerved to run all along the roof of the pit; ſo that
 “ if the colliers have the fortune to ſee it iſſuing out, there is no way to ſecure
 “ themſelves, but to lie flat unto the ſeat of the pit, and ſo do ſometimes eſcape
 “ ſo great a danger. Sometimes it hath taken its way, up at the pit-eye or ſhaft,
 “ with ſuch vehemency, that it has thrown the turn quite away from the mouth

" of the pit ; which is a great cylinder of wood, of a great weight ; and has burnt
 " and singed the ropes as black as lightening does trees.

" In Sir WILLIAM GERRARD's pits in Lancashire, and some others thereunto adjoining, there is the like damp very frequent, which the workmen also call a fiery one. The way to free the pits is this : One, thereunto hired, puts on a wet coarse frock ; this covers him all, face and head ; two holes left for his eyes, and those glazed. Thus armed, he goes into the pit to encounter his enemy, with a lighted candle in his hand, and there lays himself flat on the ground, expecting his foe, the damp, which flies about the pit in the form of a little round cloud, of the bigness ordinarily (as he expressed it) of a bladder : to this he applies his lighted candle, which presently takes fire, and not without a great noise and commotion of the air in the pit, and that a violent one, discharges itself. In some pits, if they omit to do this in due time, by the continual access of new exhalations it grows so great, that the firing of it becomes very dangerous ; an example whereof he told us : Three workmen going into a pit, wherein it was grown greater than ordinary, were, by its taking fire on a sudden, banded from one side of the pit to the other with that violence, and so singed, that two of them are in danger of their lives.

" A, the coal-pit.

" B, the vent-pit.

" C, the fow, that drains both pits and heads from water.

" D, the vent-head, which runs from the coal-pit to the vent-pit, underground, and is not above two yards broad with us.

" E, the lateral heads, which are not above two yards broad also.

" F, the diagonal pricked lines is the thurl-vent, that is, a vent through the lateral heads.

" G, the walls or pillars of the whole coal-bed remaining, which coal-bed with us is not above two foot thick, these walls or pillars of coal are always left ungotten, and to support the roof the pit-heads, to hinder it from falling.

" The roof and seat is the top and bottom of the works, wherein they get coals, which is about two foot, or more, the one distant from the other, in our pits."

After reading of this paper it was observed, that there were some other experiments formerly recommended to Dr. POWER ; and that it was desirable to have them likewise tried by him at his conveniencey, *viz.*

1. Of letting down a bladder gently distended, to see, whether it would grow more or less flaccid above ground or below.

2. Of the subsiding of quicksilver in the Torricellian experiment under ground, and observing the differences at several depths.

3. Of

3. Of trying, in the deepest part, how many vibrations of a pendulum of about 2½ inches long, a noise heard at the bottom is heard at the top.

SIR ROBERT MORAY's account of an echo in Scotland, was read, and his offer of having it more fully inquired into, and more exactly described, was accepted. The account is as follows :

" Near Rosneath, a fair house, situate upon the west side of a salt-water lake, which enters into Clyde some 17 miles below Glasgow, there is a large bay, environed with high grounds, in some places rocks, and in others covered with thickets of trees, a prospect and description whereof is hereunto annexed, taken only from inspection of the place, and the relation of such as have lived there.

" Having heard of a rare echo in the bay, I engaged some acquaintance, one evening, when the air was serene and calm, to satisfy my curiosity in making a trial of it. And having lighted on a very good trumpeter, who knew the place well, we came to the point of the bay at A, where the trumpeter placed himself near the brink of the water, which was then ebb'd so low, it left the beach some 14 or 15 foot high, like a steep bank about him; then setting his face toward C, he sounded a tune of eight semibreves, and then stopped. Just as the trumpet ended the tune, an echo began to repeat it, which it performed completely and clearly, but not altogether so loud as the trumpet. And when that echo had repeated the whole tune, another echo began, and repeated it over again, as clearly and distinctly as the first, but with a softness, that seemed to be as much weaker than the first echo, as the trumpet was louder. In like manner, no sooner had the second echo repeated the tune completely, but a third echo did begin, and repeated it once more, as entirely, clearly, and distinctly, as the others, with a degree of softness and weakness, that seemed to hold proportion with the rest; and then all was silent. This we tried again and again, with the same success, to the great satisfaction of the company. I cannot venture to give any account of the precise places, whence the three several reflexions of the sound came, because I neither can condescend upon the precise time of the duration of the tune, nor the exact situation, figures, and distances of the hills, rocks, houses, and woody places; only I do guess, that the tune lasted at least ten seconds. That the first echo seemed to come from between B and C, the second from about D, and the third from between D and E. But if the society think it worth the labour, to procure an account of all, I will endeavour to employ a very skilful and curious person about it, who shall measure the duration of the tune, and of every reflexion and interval, by a half-second pendulum; and taking the distances of places, by instrumental observations, shall make an exact map thereof; and withall give an account of some other echoes thereabout, which I forbear to mention, because I never tried them.

Original Register, vol. ii. p. 52.

- "A, is a point of low ground, not 6 foot above the water at a full sea, where the beach is, at low water, pretty steep, like a bank, some 15 or 16 foot in height.
- "B, a rocky precipice, some ten or twelve yards high, esteemed to be $\frac{1}{2}$ of a mile distant from A, and extended in length some 100 or 120 yards, woody at the top. Between B and C, lies a narrow valley, through which passeth a small brook, that drives a mill.
- "C, a house, all built of stone, about which the face of the rising hills is rocky, and covered here and there with trees.
- "D, is a church, standing low upon the shore, near which the face of the hill is rocky.
- "E, another church, standing low, on the north side whereof, at * * miles distance, or so, the ground riseth into hills, where there are rocky precipices and woody places.
- "F, the head of the lake, which is every where environed with high and hilly ground, from within a mile of the river of Clyde.
- "G,
- "H, the house of Rosneath."

It was ordered, that Mr. BARROW be desired to give an account of an echo at Cambridge.

Mr. HAAK's paper concerning Colchester oysters was read; and ordered to be registered *.

After reading this paper, Dr. MERRET suggested, that it should be inquired, whether oysters do not differ in sex, it being observed, that some of them, supposed to be females, are all white, and cast forth a kind of spittle; and that others, esteemed to be males, have a black spot, and do not spit. He mentioned likewise, that the age of oysters was known by the thickness and friableness of their shells. He was desired to communicate his observations upon this subject. He was also put in mind of his observations upon wires; and likewise of the way of making and colouring all sorts of earthen vessels.

Dr. MERRET also produced his catalogue of the natural things of England, and of the rarities thereof; which he was desired to complete, and to communicate to the society.

Mr. HOOKE made the experiment of weighing rarefied and common air in little glass-bubbles; and the difference was found to be near $\frac{1}{2}$ a grain in one of them, and above $\frac{1}{2}$ a grain in another *.

* Register-book, vol. i. p. 209.

* This paper is printed in the *Philosophical Experiments and Observations of Dr. ROBERT HOOKE,*

published by W. DERHAM, F. R. S. p. 6.

He

He also brought in an account of measuring the expansion of the air, *viz.* what proportion the decrease of its force holds to its increase of dimension; the reading of which was deferred till the next meeting.

He proposed, for that meeting, the experiment of weighing ascending and descending bodies in water, *viz.* what weight they add to the vessel containing the water.

He was desired to prepare also for the making of the experiment of water freed from air; which, according to Monf. HUYGENS^b, does not descend in the cane, after the air is exhausted out of the receiver.

Dr. GODDARD was desired to make LINUS's experiment, mentioned by Monf. HUYGENS in the same letter, *viz.* of the finger's sticking close to the tube, with both ends open, and shorter than $9\frac{1}{2}$ inches.

December 10. The experiment of purging water from air, to see whether it subsides, according to the Torricellian experiment, was deferred till the next meeting, because the engine was not tight.

Dr. CROUNE brought in some account of the breaking of wires; the experiment whereof appearing as yet very uncertain, he was desired to prosecute the same, by trying several wires of different matter, and the same size, to see, whether the proportion of toughness in different metals may be found.

Mr. HENSHAW presented his experiments of freezing; which were ordered to be registered^c, and were as follow:

1. " Take a beer-glass, and fill it with water up to the brim; then strike it over with a knife, that the water may not stand higher in the middle than at the sides; set it out to freeze, and you shall find the ice stand a considerable height above the brim of the glass, proportionably to the quantity of water, that was contained in it.
2. " Take a bolt-head, and fill it with water till it rise 4 inches in the neck; make a mark where the water stands, and leaving it open at the top, expose it to the cold, and when it is frozen, you shall find the ice rise much higher in the tube than the water was.
3. " Take a small bolt-head of white glass, whose globe is not above 3 inches diameter; cut off the tube within an inch of the globe, fill it with water up to the neck, stop it well with a cork, so as there be left no space between the cork and the water; cut the cork close to the tube, and cover it over well with molten hard wax; expose it, and when it is frozen, you will find it equally ex-

^b In a letter to Sir ROBERT MORAY, from the

Hague, 1 Dec. 1662, N. S. entered in the Let-

ter-book, vol. i, p. 69.

^c Original Register, vol. ii. p. 42.

“ tended every way, that the globe will be cracked into many circles, almost exactly equidistant, and intersecting one another, like meridians at the poles.

4. “ It were worth the trial, whether any of the former experiments would succeed in the same manner with water, whose air hath been exhausted in Mr. Boyle’s engine.

5. “ Take a good quantity of rosemary, box, holly, ivy, cypress, or any other plant, that is green at this time of the year; when you have well dried them in an hot oven, set fire to them, and burn them to ashes, each apart from the other, and with several ashes make several *lixivia*’s; or for the want of them, with the salt of wormwood, scurvigrafs, and other salt of plants, to be found ready made at the apothecaries; expose these salts in earthen pans or dishes, and at the same time common water in the like vessels; by which may be experimented the truth of what is related by QUERCETAN and other chemists, that the figures and shapes of the plants will be found in the ice: and whether the same may not casually happen in common water; for I have sometimes observed in the superficies of pond-water frozen in that manner the figures, as it seemed to me, of oaken leaves, and sometimes of other plants.

6. “ Make several *lixivia*’s of common salt, allum, petre, the several vitriols, sal-gem, borax, sal armoniac, sandiver, &c. expose them as you did the *lixivia*’s of the herbs, in divers dishes of the same magnitude and capacity, and observe whether they do all freeze as soon and as hard the one as the other; for to me it happened, that the *lixivium* made with saltpetre did not freeze at all.

7. “ Take common water, whose air hath been drawn out in Mr. BOYLE’S engine, and freeze it in a small bolt-head (for ordinary water so frozen, by reason it is turbid and full of cavities, will not do) then gently breaking off the glass, try whether in a clear day it will not contract the sun-beams to a point, and burn in some measure like a crystal ball. For want of sun, the contraction may be tried with a candle.

8. “ Take common water freed from air, as above-said, and freeze it in open glasses, made of any section of a sphere, or cut off from a hollow globe of glass by a hot iron, or on a spectacle-maker’s tool; try whether it will magnify equal to a glass of the same radius, or what refraction it will make of the visible species: as also what diaphaneity it hath proportionally to a glass of the same thickness.

9. “ Try whether warm water will sooner freeze than cold water exposed at the same time, and in the same quantity, as it is affirmed by some authors.

10. “ Try whether the first ice, that crusteth on sea-water or salt dissolved in common water, be fresh, as it is said.

11. “ Take

11. "Take a bolt-head, put in a good quantity of ice, in as big lumps as you can get to go into the mouth of it: seal up the bolt-head hermetically, then weigh it immediately, after thaw the ice, then weigh it again, and see whether it weigh less than before, as is affirmed by HELMONT in *Bartolinus de Nive*.

12. "Take what quantity of water you please, in a bolt-head open, weigh it exactly, then expose it; when it is frozen, weigh it again, and see, if it does not weigh heavier.

13. "Take a quantity of snow, thaw it gently by the fire into water, then expose the water, and when it is frozen again, observe whether it be not more turbid and less diaphanous than common ice.

14. "Take an iron-pot, fill it with snow, place in the middle of it a bolt-head half full of water; set the pot over a flaming fire, that the flame may reach the sides as well as the bottom of the pot; when the snow is almost all melted, take out the bolt-head, and see whether the water in it be frozen."

Dr. MERRET gave an account of some of these experiments from his own observations, and was desired to try the rest, and to bring in the relation now made by him on the Wednesday following in writing, together with what he should observe in the mean time.

Mr. OLDENBURG communicated some inquiries concerning freezing, which were recommended likewise to Dr. MERRET to make the experiments of.

Dr. CROUNE brought in a dead parroquet to be embalmed by Mr. CREW at the recommendation of Dr. CHARLTON; who being absent, the president undertook to convey it to him.

Several letters of Sir WILLIAM PETTY were read, concerning the farther success of his new ship; one to the president, another to Sir ROBERT MORAY, and two to Mr. GRAUNT; of all which extracts were ordered to be taken and entered^a: and Dr. WILKINS was desired to draw up a letter to Sir WILLIAM PETTY from the society, expressing their thanks for his communications, and encouraging him to prosecute his invention.

Mr. BOYLE sent a pewter-bottle stopped up, broken with common water frozen in it.

Mr. HOOKE's account of the rarefaction of air was read, and ordered to be registered^a, as follows:

"I took a small and indifferently even-drawn tube of glass, about six foot long, and less than $\frac{1}{2}$ of an inch in the hollow, that was open at both ends; and having

^a The extracts do not appear in the letter-book. ^a Original Register-book, vol. ii. p. 55.

" by

by a small list of paper, that was pasted upon it, divided it into inches, halves and quarters, I put it into a bigger glass-tube, that was hermetically sealed at one end, and big enough to contain the former. Then I fastened them perpendicularly against the side of the wall, and filled them together to the top with quicksilver, then letting the small one rise, till it ascended somewhat more than four inches above the surface of the mercury in the greater, I carefully sealed up the upper end of it with hard sealing-wax, and letting it cool for about half an hour, I lifted up the smaller tube, till the air was expanded so as to fill six inches, and observed the subjacent pillar of mercury $10\frac{1}{2}$ inches. Then I lifted it higher, till the air filled full eight inches, and found the φ $15\frac{1}{2}$ inches. And so proceeding, I collected this table; which by reason the tube (as I afterwards found) was somewhat bigger toward the middle than near the upper end, does not exactly agree with the hypothesis, which supposes the degrees of rarefaction and force to be in reciprocal proportion; though in other experiments of the same kind, that I have formerly tried with a much more exact tube, I have found it to come very near. Afterwards I deprest again the small tube into the greater, and found the air to return to its former dimensions, which assured me, it had not leaked at the top.

| The air's expansion. | The φ height. |
|-------------------------|--------------------------|
| 4 | 00 |
| 6 | $10\frac{1}{2}$ |
| 8 | $15\frac{1}{2}$ |
| 12 | $20\frac{1}{2}$ |
| 16 | $23\frac{1}{2}$ |
| 20 | $24\frac{1}{2}$ |
| 24 | $25\frac{1}{2}$ |
| 32 | $26\frac{1}{2}$ |

This experiment, were there not, first, a great difference as to heat and cold in the upper and lower regions of the air, which perhaps may render some of the upper parts more dense than the lower; and were there not, secondly, a great disparity in the constitution of the air by vapours and exhalations, which as they may by mixing with the parts of the air much augment the gravity, so they much alter the elater or expansive power of the air; this experiment, I say, were it not for these difficulties, would afford us a very desirable help to guess at the height of the atmosphere. For since, by the accurate experiments of Mr. BOYLE, we have the height of the atmospherical cylinder, if of a uniform extension 35,000 foot, if we suppose the cylinder divided into 1000 equal parts, each of these would be 35 foot long, did not the elastical power of the air, by reason of the unequal pressure incumbent on each of them, much alter this extension. And did the elater and pressure of the greater cylinder of the atmosphere follow the laws we have observed in this experiment, each of those thousand equal parcels of air would receive an increment (above its length of 35 foot) which may readily be found and expressed by a number in the form of a fraction,

| | |
|------|--------------------|
| 1000 | 00000 |
| 999 | 35000 |
| 998 | 17500 |
| 997 | $11656\frac{1}{2}$ |
| 996 | 8750 |
| 995 | 7000 |
| 994 | $5833\frac{1}{2}$ |
| 993 | 5000 |

whose numerator is its distance from the surface of the earth, and its denominator the complement of that number to 1000. Thus the lowest division will be $1\frac{35}{999}$, the first above the surface of the earth $1\frac{1}{998}$, the second $1\frac{1}{997}$, the third $1\frac{1}{996}$, the fourth $1\frac{1}{995}$, the fifth $1\frac{1}{994}$, the sixth $1\frac{1}{993}$, and so till you come to the last; as for instance, the 996 division about the earth will be extended to $1\frac{35}{996}$ of the lowest, the 997 to $1\frac{35}{997}$, the uppermost but two will be extended $1\frac{35}{998}$, the highest

| | | |
|-----|--------------------|---|
| 992 | 4375 | “ highest but one $1^{\circ} 2'$, and the highest of all $1^{\circ} 20'$ seems |
| 991 | 3888 $\frac{1}{2}$ | “ to be indefinite, and may perhaps ascend many hundred |
| 990 | 3500 | “ miles. And, according to this rule, having cast up |
| 989 | 3181 $\frac{1}{2}$ | “ the length of some of the uppermost, I found the length |
| 988 | 2916 $\frac{1}{2}$ | “ or extension of the twenty equal divisions next below the |
| 987 | 2692 $\frac{1}{2}$ | “ uppermost, to amount to somewhat more than twenty- |
| 986 | 2500 | “ five miles, as by the table appears. I think it were |
| 985 | 2333 $\frac{1}{2}$ | “ worth while, by such as have opportunity, to inquire |
| 984 | 2187 $\frac{1}{2}$ | “ how near experiments made for the finding the air's |
| 983 | 2058 $\frac{1}{2}$ | “ extension on high buildings or hills, and in deep wells |
| 982 | 1944 $\frac{1}{2}$ | “ or mines, agree with this hypothesis, and how much it |
| 981 | 1842 $\frac{1}{2}$ | “ differs. This I am sure, that there may be a very fen- |
| 980 | 1750 | “ sible difference found in the pressure of the air at so |

125915

Fractions 5 prox.

5000
a mile)

125920 (257 $\frac{1}{2}$
Eng. feet miles.

“ little a height as thirty-five foot: for I lately made a
“ trial at that height with a convenient vessel, and found
“ an inch difference in a cylinder of water. And this I
“ found constant, by repeating the experiment six or
“ seven times; but in what proportion it expanded, I
“ have not examined.

“ After this experiment I opened the top of the small tube, and filled up the
“ four inches of space above the γ with coarse spirit of wine, and then again I
“ carefully sealed up the top with wax and cement, leaving not the least sensible
“ parcel of air at the top. After this I found, that till I had, by lifting up the
“ small pipe, made the cylinder of mercury about twenty inches high, there scarce
“ appeared any bubble: but then I observed three or four small bubbles to arise
“ from the bottom, which there appeared no bigger than the point of a pin, but
“ ascending grew bigger and bigger, with so strange an increase, that they were
“ as big as pease before they came to the top; which bubbles now kept the spirit
“ of wine from touching the top. Proceeding, I observed this aerial substance to
“ extend itself, and fill half an inch, when the subjacent mercurial cylinder was
“ 26 $\frac{1}{2}$ inches; the spirit of wine falling four inches. I lifted the tube higher, and
“ found the aerial substance fill 4 $\frac{1}{2}$ inches, the spirit of wine 3 $\frac{1}{2}$, the γ 28 $\frac{1}{2}$. I
“ proceeded further, and found the aerial substance 27 inches, the spirit 3, and
“ the γ 29 $\frac{1}{2}$; which clearly evidences, that the aerial substance at the top (though
“ it seemed generated out of the spirit) had an elastical property, since the mercurial
“ cylinder increased in height, as that was more expanded; but whether it
“ were air, I dare not determine. Fastning the small tube at that height I had last
“ lifted to, I observed some rising bubbles to increase more strangely than before;
“ in so much as, when they came to the top, to throw up the spirit of wine before
“ them three or four inches: many of these I observed to do the same thing. I
“ heated that part of the tube, where the aerial substance was, but found it not de-
“ press the γ ; but heating that against the spirit of wine till it began to boil, the
“ γ was depressed above an inch; but removing the candle after a little time,
“ the γ returned to its former height. This experiment seems to me a good ar-
“ gument, to confirm the hypothesis of the pressure of the air upon the terraque-

“ ou 3

ous globe. For the bubbles, that ascend from the bottom of water, when the top of it is exposed to the free air, do very little, or not sensibly, increase in bulk. And that because their pressure decreases but as 100006, 100005, 100004, 100003, 100002, 100001, 100000, because 100000 (which round number we take for the pressure of the atmosphere) is added to 6, 5, 4, 3, 2, 1, the pressure of the water. Whereas when the 100000, or weight of the atmosphere is removed, the pressure on the ascending bubbles decreases as 6, 5, 4, 3, 2, 1, 0."

Mr. HOOKE was desired to make at the next meeting the experiment with quick-silver and spirit of wine, mentioned by him in the preceding paper :

To make that of weighing ascending and descending bodies in water : And

To distil some water, and to see, whether the half of it being distilled weighs as much as the other half remaining in the retort ; to find out, whether there be some parts in water subtiler and finer than others.

Sir ROBERT MORAY described a kind of furnace, which puts air into a flame by pipes being outwardly heated and blown by bellows ; by the means of which furnace, some persons pretend to melt ore into water.

Mr. HOSKYNs was desired to peruse the authors, who have written of Iceland and the neighbouring countries ; and to collect thence the observables in those parts for farther inquiry to be made thereof by a person going thither : and a weather-glass was directed to be sent thither.

It was ordered, that Dr. POWER be desired to make some experiments of freezing in mines, together with the others not yet made by him.

Mr. OLDENBURG read some aphorisms for cider sent to him in a letter from Mr. JOHN BEALE to be communicated to the society ; who ordered them to be registered¹. They were as follow :

1. " He, that would treat exactly of cider and perry, must lay his foundation so deep as to begin with the soil. For as no culture or graffes will exalt the French wines to compare with the wines of Greece, Canaries, and Montefalco ; so neither will the cider of Bromyard and Ledbury equal that of Allensmore, Hom-Lacy, and King's-Chapel, in the same small county of Hereford.

2. " Yet the choice of the graffe or fruit hath so much prevalency, that the red-streak cider will every where excel the common cider ; as the grape of Frontignac, Canary or Baccharach excels the common French grape, at least till by time and traduction in degenerateth.

¹ Original Register-book, vol. ii. p. 195.

3. " I cannot divine, what foil or what fruit would yield the best cider ; or how excellent cider or perry might be, if all foils in common, and all fruits were tried : but for thirty years I have tried all sorts of cider in Herefordshire, and for three years I have tried the cider in Somersetshire, and for some years I have had the best cider of Kent and Essex at my call ; yet hitherto I have always found the cider of Herefordshire the best, and so adjudged by all good palates.

4. " I cannot undertake to particularize all kind of foil, no more than to compute how many syllables may be drawn from the alphabet, the number of alphabetical elements being better known than the ingredients and particles of foil ; as chalk, clay, gravel, sand, marl, (the tenaciousness, colour, and innumerable other qualities, shewing endless diversities) and the fruit of crabs, apples and pears, being as various as of grapes, figs, and plums.

5. " Yet in gross this I note, that as *Bacchus amat colles*, and a light mold ; so our best cider comes from the hot rye-land ; and in fat wheat lands it is more sluggish ; and in white stiff clay-land (as in Woodhope in Herefordshire) the common cider retains a thick whey colour, and not good : only such as emergeth there (by the diligence of some art of the inhabitants) is bright and clear, and so lively, that they are apt to challenge the best.

6. " Some cider mixeth kindly with water in the cider-mill, and will hold out a good small wine, and less inflaming, all the following summer. Some cider (as of Longhope, a kind of four woodland country of Herefordshire) will not bear any mixture of water, but soon decay, and turn more harsh and sour : and thus we noted in France, some coarse wines stuck like paint in the glass, unwilling to incorporate with the water. Vin d'Aye and other delicate wines did spread themselves more freely, as gold is more ductile than baser metals.

7. " Some would, for a fit, extol the cider of pear-mains, some of pippins (and of pippins I have found a congenial liquor, less afflicting splenetic persons, as in mine own experience I conceived) and Sir HENRY LINGEN once extolled the cider of Eliots, as rightly bedewing the glass like best Canaries ; and full hogsheads of the stockin apple have been tried amongst us, but disappointing our expectation, though perchance by evil ordering : yet Mr. GRITTON highly boasted a mixture of stockin-apples and May-pears, tried (as I take it) by himself. After many years trials of those and many other kinds, the red-streak carried the common fame, and from most of those reduced admirers.

8. " I did once preserve the jennet-moyle cider, but had only the ladies on my side, as gentler for their sugery palates, and for one or two sober draughts ; but I saw cause to recant, and to confess the red-streak to warm and whet the stomach, either for meat or more drink.

9. " The right cider-fruit is far more succulent, and the liquor more easily divides from the pulp of the apple, than in best table-fruit, in which the juice and the pulp seem friendly to dissolve together on the tongue's end.

VOL. I.

U

10. " The

10. " The liquor of best cider-fruit in the apple, in best season of ripeness, is more brisk and smart than that which proves duller cider : and generally the fiercest pears and a kind of tamer crabs (and such was the red-streak called in my memory) makes the more winy cider.

11. " PALLADIUS denieth perry to bear the heat of summer ; but there is a pear in Bosbury or thereabouts, which yields the liquor richer the second year than the first ; and so by my experience very much amended the third year. They talk much higher, but that is beyond my account.

12. " As cider is for some time a sluggard, so by like care it may be retained to keep the memorials of many consuls ; and these smoaky bottles are the nappy wine. My lord SCUDAMORE seldom fails of three or four years ; and he is nobly liberal to offer the trial.

13. " As red apples, so red pears (and amongst them the red horse-pear, next to the Bosbury) have held out best for the stomach and durance : but pears do less gratify the stomach than apples.

14. " The season of grinding these harsh pears is after full maturity, not till they have dropt from the tree, and there lain under the tree, or in heaps, a week or thereabouts.

15. " And so of cider-apples, as of grapes ; they require full maturity, which is best known by their natural fragrancy : and then also, as ripe grapes require a few mellowing days, so do all apples ; as about a week or little more, so they be not bruised, which soon returns to rottenness ; and better sound from the tree, than rotten from the heap.

16. " That due maturity and some rest on the heap make the liquor taste rather of apples, than winy, hath no more truth (if the cider be kept to fit age) than that very old cheeke doth taste of a posset.

17. " The harsher the wild fruit is, the longer it must lie on heaps. For of the same fruit, suddenly ground, I have tasted good verjuice : but on heaps till near Christmas, all good fellows called it Rhenish-wine.

18. " The grinding is somewhat considerable, rather too much than too little. Here I see a mill in Somersetshire, which grinds half a hoghead at a grist ; and so much the better ground for the frequent rolling.

19. " Soon after grinding it should be prest, and immediately be put into the vessel, that it may ferment before the spirits be dissolved ; and then also in fermenting time, the vent-hole should not be so wide, as to allow a prodigal waste of the spirits ; and as soon as the ferment begins to allay, the vessels should be filled of the same and well stopp'd.

20. " Of

20. " Of late it is much commended, that before it be pressed, the liquor and must should for twenty-four hours ferment together, in a vat for that purpose covered, as ale or beer in the yeast-vat, and then tunned up. This is said to enrich the liquor, and to give it somewhat of the tincture of some red apples, as I have seen, and very well approved.

21. " As sulphur hath some use in wines, so some do lay brimstone on a rag, and by a wire let it down into the cider-vessel, and there fire it; and when the vessel is full of the smoke, the liquor speedily poured in ferments the better. I cannot condemn this, for sulphur is more kind to the lungs than cider; and the impurity will be discharged in the ferment.

22. " Apples overlong hoarded before grinding will for a long time hold the liquor thick; and this liquor will be both pleasant, and, as I think wholesome: and we see some rich wines of the latter vintage, and from Greece, retain a like crassitude; and they are both meat and drink.

23. " I have seen thick harsh cider, the second summer, become clear and very richly pleasant; but I never saw clear acid cider recover.

24. " Wheat or leaven are good and kind in cider, as in beer; juniper-berries agree well and friendly for coughs, weak lungs, and the aged; but not at first for every palate. The most infallible and undiformed improver is mustard; a pint to each hogthead bruised, as for sauce, with a mixture of the same cider, and applied as soon as the vessel is to be closed after fermenting.

25. " Bottling is the next improver, and proper for cider. Some put two or three raisins into every bottle, which is to seek aid from the vine. Here in Somersetshire, I have seen as much as a walnut of sugar, not without need for this country cider.

26. " Crabs do not hasten the decay of perry, but preserve it, as salt preserves flesh. But pears and crabs being of a thousand kinds, require more aphorisms.

27. " Neither wheat, leaven, sulphur, nor mustard are used but by very few, and therefore are not necessary to make cider last well for two, three, or four years.

28. " The time of drawing cyder into bottles is best in March, it being then clarified by the winter, and free from the heat of the sun.

29. " In drawing, the best is nearest the heart or middle of the vessel, as the yolk in the egg.

30. " Red streaks are of divers kinds, but the name is in Herefordshire appropriated to one kind, which is fair and large, of a high purple colour, the smell never aromatical, the tree a very shrub, soon bearing a full burthen, and seldom or

" failing till it decays, which is much sooner than other apple-trees. 'Tis lately
 " spread all over Herefordshire; and he, that computes speedy return and true
 " wine, will think of no other cider-apple till a better be found.

31. " I said, the red-streak is a small shrub; it is of small growth, where the
 " cider proves richest, for aught we have yet seen in Herefordshire, viz. in light
 " quick land: and if the land be very dry, jejune and shallow, that and other ci-
 " der-fruit (especially the jennet-moyle) will suspend the store of fruit alternatively
 " every other year, except some blatts or surprizing frosts in the spring alter that
 " method; for two bad years come seldom together, very rarely three.

32. " In good soil, I mean of common field (for fat land is not best for cider-
 " fruit, but common arable) I have seen the trees of good growth, almost equalling
 " other cider-trees, the apples larger, and seldom failing of a full burthen: thus in
 " the vales of wheat lands, in stony globe or clay, where the cider is not so much
 " extolled. But still sack is sack, and canary differs from claret; so does red-streak
 " cider of the vale excel any other cider of the forcible soil.

33. " Yet this distinction of the soil requires much experience and great heed,
 " if we insist upon accurate directions. For, as LAURENBERG saith, in *pingui solo*
 " *non feruntur omnia rebus, neque in macro nibil.* And for gardens, flowers and or-
 " chards, I would choose many times such lands, as do not please the husbandman
 " either for wheat or sweet pasture, which are his chief aims. And thus LAU-
 " RENBURG, *In arida & tenui terra felicius proveniunt ruta, allium, petroselinum, cra-*
 " *cus, hyssopus, capparis, lupini, sativum, thymus. Arborea quoque tenue & macilentum*
 " *solum amant; itemque frutices plerique, *** arbores scilicet, pomi, piri, cerasus,*
 " *prunus, persica, cotonea, mori, juglans, coristi, staphylodendrum, mespilus, ornus, casta-*
 " *nea, &c. Frutices sili. vitis, berberis, genista, juniperi, oxioacantha, periclymenum,*
 " *rosa, ribesum, uva, spina, vaccinia, &c.*

34. " But here also we must distinguish, that pears will bear in a very stony,
 " hungry, gravelly land, such as apples will not bear in; and I have seen pears
 " bear in a tough, binding, hungry clay, when apples could not so well bear it,
 " (as the smooth rinds of the pear-trees, and the mossy and cankered rinds of the
 " apples did prove) the root of a pear-tree being, it seems, more able to pierce a
 " stony and stiff ground. And cherries, mulberries, and plums can rejoice in a
 " richer soil, though by the smallness of the roots the shallower soil will suffice them.
 " And *** require a deeper ground, and will bear with some degrees of
 " hungry land, if they be supplied with a due measure of succulency or neigh-
 " bouring moisture: and the other shrubs, according to the smallness of their
 " roots, do generally bear a thinner land. And I have seen a soil so much too
 " rank for apples and plums, that all their fruit from year to year were always
 " worm-eaten, till their lives were forfeited to the fire.

35. " To take up from these curiosities the most useful results to our purpose,
 " we have always found those orchards to grow best, last longest, and bear most,
 " which are frequently tilled for barley, wheat, or other corn, and kept (by culture
 " and

“ and seasonable rest) in due strength to bear a full crop. And therefore, where-
 “ as the red-streak might otherwise without much injury be planted at fifteen or
 “ twenty foot distance, and the best distance for other cider-fruit hath heretofore
 “ been reputed thirty or thirty-two foot; very good husbands do now allow their
 “ largest enclosures (as of twenty, forty, or a hundred acres) fifty or sixty foot dis-
 “ tance, that the trees may not much hinder the plough, and yet receive the bene-
 “ fit of compost. And a horse-team well governed will (without any damage of
 “ danger) plough close to the trees.

36. “ In such soil as is here required, namely, of good tillage, an orchard of
 “ grafted red-streaks will be of good growth and good burthen within ten or twelve
 “ years, and branch out with good store to begin an encouragement at three years
 “ grafting; and (except the land be very unkind) will not yield to any decay with-
 “ in sixty or eighty years, which is a man’s age.

37. “ In some sheets I rendered many reasons against Mr. AUSTEN of Oxford,
 “ why we should prefer a peculiar cider-fruit, which in Herefordshire are generally
 “ called mufts (both the apple and the liquor and the pulp together in the con-
 “ fusion) as from the Latin *Muſtum*, white mufts of divers kinds, red cheek and
 “ red-streakt mufts of several kinds, green mufts, called also green fillet, and blue-
 “ spotted: why, I say, we should prefer them for cider before table-fruit, as pip-
 “ pins, pear-mains, &c. And I do still insist on them; 1st, The liquor of these
 “ cider-fruit, and of many kinds of austere fruit, which are no better than a fort
 “ of full succulent crabs, is more sprightly, brisk and winy. For essay, I sent up
 “ many bottles to London, that did me no discredit. 2dly, One bushel of the
 “ cider-fruit yields twice or thrice as much liquor. 3dly, The tree grows more
 “ in three or four years, than the other in ten years, as I oftentimes remarked.
 “ 4thly, The tree bears far greater store, and doth more generally escape blasts
 “ and frosts of the spring. I might add, that some of these, and especially such
 “ pears as yield the best perry, will best escape the hand of the thief, and may be
 “ trusted in the open field.

38. “ By the first, second, and fourth of these reasons, I must exclude the jen-
 “ net-moyle from a right cider-fruit, it being dry, and very apt to take frosty
 “ blasts; yet it is no table-fruit, but properly a baking-fruit, as the ruddy colour
 “ from the oven shews.

39. “ I said, that the right cider-fruit, generally called mufts, and deserving the
 “ Latin name *Muſtum*, is of divers kinds; and I have need to note more expressly,
 “ that there is a red-streak muft (as I have often seen) but not generally known,
 “ that is quite differing from the famous red-streak, being much less, somewhat
 “ oblong, and like some of the white mufts in shape, and full of a very good winy
 “ liquor. I could willingly name the persons and place, where the distinct kinds
 “ are best known. It was first shewed me by JOHN NASH, of Ashperton in Here-
 “ fordshire; and for some years they did in some places distinguish a red-streak,
 “ as yielding a richer red-streakt cider, of a more fulvous or ruddy colour: but
 “ this difference (as far as I could yet find) is but a choice of a better insolated or
 “ more

“ more ruddy fruit, of the best kind, as taken from the south part of the tree, or
 “ from a soil that renders them richer. But my lord SCUDAMORE’s is safely of the
 “ best fort; and Mr. WHINGATE of the Grainge, in Democ, and some of King’s-
 “ Chapel, do best know these and other differences: streaked must, right red-
 “ streak, red red streak.

40. “ The greenish must, (formerly called in the language of that country the
 “ green fl let) when the liquor is of a kindly ripeness, retains a greenness equal to
 “ the Rhenish glass; which I note for them, that conceive no cider to be fit for use
 “ till it be of the colour of old sacks.

41. “ To direct a little more caution for inquiry of the right red-streak, I should
 “ give notice, that some months ago Mr. PHILIPS of Mountague in Somerset-
 “ shire shewed me a very fair large red-streak apple, that by smell and sight seem-
 “ ed to me, and to another of Herefordshire then with me, to be the best red-
 “ streak: but when we did cut it and taste it, we both denied it to be right (the
 “ other with much more confidence than myself). But Mr. PHILIPS making
 “ cider of it, this week invited me to it, assuring, that already it excels all high
 “ country wine; and he wants not a discerning palate for wines. It had not such
 “ plenty of juice as our red streaks with us, and it had more of the pleasantness of
 “ table-fruit, which might be occasioned (for aught I know) by the richer soil.

42. “ I may now ask, why we should talk of other cider-fruit or perry, if the
 “ best red-streak have all the aforesaid pre-eminences of richer and more winy
 “ liquor, be half sooner an orchard, more constantly bearing, &c. An orchard of
 “ red-streaks is commonly as full of fruit at ten years, as other cider-fruit at
 “ twenty years, or as the pippin or pear main at thirty, or thereabouts.

43. “ But all soils bear not apples; therefore for perry, which is the goodlier
 “ tree for a grove, to shelter a house and walks from summer’s heat and winter’s
 “ cold winds, and far more lasting, the pleasantest cider-pear of a known name
 “ amongst them is the horse-pear. And it is much argued, whether the white
 “ horse-pear or red horse-pear is the better; where both are best, within two miles
 “ they differ in judgment: the pear bears almost its weight of sprightly winy
 “ liquor; and I always preferred the tawny or ruddy horse-pear, and generally that
 “ colour in all pears, that are proper for perry.

44. “ I recited PALLADIUS against the durability of perry; his words are,
 “ *Hieme durat, sed primâ accescit estate.* Tit. 25. Febr. Possibly so of common pears,
 “ and in hotter countries. But from good cellars I have tasted a very brisk,
 “ lively, and winy liquor of these pears during the end of summer. And a Bos-
 “ bury pear I have named and often tried, which without bottling in common
 “ hogheads of vulgar and indifferent cellars, proves as well pleasanter, as richer
 “ the second year, and yet also better the third year. A very honest, worthy, and
 “ witty gentleman of that neighbourhood would engage to me, that in good cel-
 “ lars, and in careful custody, it surpasseth any account of decay, and may be
 “ heightened to a kind of aquavite. I take the information worthy the file of our

“ modern improvements. This pear-tree grows in common fields, and wild stony ground, to the largeness of bearing one, two, three or four hogheads each tree.

45. “ This Bosbury tree, and such generally as bear the most lasting liquor and winy, is of such unsufferable taste, that hungry swine will not smell to it; or if hunger tempt them to taste it, at first crush they shake it out of their mouths (I say not this of the horse-pear): and the clowns call other pears of best liquor choak-pears; and will offer money to such, as dare adventure to taste them, for their sport: and their mouths will be more stupefied, than at the root of Wake-robin.

46. “ A row of crab-trees will give an improvement to any kind of perry; and since pears and crab-trees may be of as many kinds as there are kernels or different kinds or mixtures of soils; in a general character I would prefer the largest and fullest of an austere juice.

47. “ Mr. LILL of Marole (aged about ninety years) ever observed this rule, to graffe no wild pear-tree till he saw the fruit; if it proved large, juicy, and brisk, it failed not of good liquor. But I see cause to say, that to graffe a young tree with a riper graffe, and known excellency, is a sure game, and hastens the return.

48. “ Mr. SPEKE (last high sheriff of Somersetshire) shewed me in his park some store of crab-trees, of such huge bulk, that in this fertile year, he offered a wager, that they would yield one or two hogheads of liquor each of them; yet were they small dry crabs.

49. “ I have seen several sorts of crabs (which are the natural apple, or at worst but the wild apple) which are as large as many sorts of apples, and the liquor winy.

50. “ I have disclaimed the guilt of juniper-berries in cider; I tried it only once for myself, and drank it before Christmas: possibly in more time, the relish had been subdued or improved, as the hops in stale beer, and of runner in good Parmasán. Neither was the guilt to me otherways unpleasant, than as aniseeds in bread, rather strange than odious, and by custom made grateful; and it did hasten the clarification, and increased the briskness to an endless sparkling. Thus it indulgeth the lungs, and nothing more cheap: where juniper grows, a girl may speedily fill her lap of the berries.

51. “ Cider being windy before maturity, some, that must not wait the leisure of best season, do put sprigs of rosemary and bays into the vessel; the first, good for the head, and not unpleasant; the second, an antidote against infections, but less pleasant till time hath incorporated the tastes.

52. “ And why may we not make mention of all these mixtures, as well as the ancients of their *vinum marrubii*, *vinum abrotanites*, *absinthibites*, *byssopites*, *marabrites*, *thymites*, *cydonites*, *myrtites*, *scillites*, *viblacum*, *forbi*, &c.

53. “ And

53. "And for mixtures, I think we may challenge the antients in naming the red raspy, of which there is in this country a lady that makes a bonetta, the best of summer-drinks. And more yet, if we name the clove-gilly-flower, or other gilly-flowers, a most grateful cordial, as it is infused by a lady in Staffordshire of the family of the Devereux's, and by some ladies of this country.

54. "I could also give some account of cherry-wine, and wine of plums. Their vast store in some places, under a penny the pound, and their expeditious growth, make it cheap enough: and as in the other, so in these, the large English or Dutch sharp cherry, and the full black tawny plum, as big as a walnut (not the kinds of heart cherries, nor the plum which divides from the stone) make the wine. Their cheapness should recommend them to more general use at tables, when dried (an easy art) and then whollomer.

55. "To return to redstreak; it is a good drink, as soon as well fermented, or within a month; better after some frosts, and when clarified; rich wine, when it takes the colour of old sack. In a good cellar, improves in hogheads the second year. In bottles and fandy cellars, keeps the records of late revolutions and old mayoralties. Quære the manner of laying them up in sand-houfes.

56. "I tried some bottles all a summer in the bottom of a fountain; and I prefer that way where it may be had: and it is somewhat strange, if the land be neither dry for a sand-houfe, nor fountainous for this better expedient.

57. "I must not prescribe to other palates, by asserting how good cider may be made, or to compare it with wines; but when the late king, of blessed memory, came to Hereford in his distress, and such of the gentry of Worcester-shire, as were brought thither as prisoners, both king, nobility, and gentry, did prefer it before the best wines those parts afforded; and, to my knowledge, that cider had no kind of mixtures; and generally all the gentry of Herefordshire do abhor all mixtures."

Dr. GODDARD was desired to bring in the experiment of LINUS, about the sticking of the finger to the tube, that is less than $29\frac{1}{2}$ inches; as also that of forcing water out of certain glass vessels, by its own vapour, raised in it by hot water.

Dr. WILKINS undertook to inform the society concerning Mr. TOWGOOD's sucking pump raising water 42 foot high.

Dr. MERRET gave in his observations concerning the ordering of wines; the reading of which was deferred till the next meeting.

December 17. The experiment of expanding the air from the spirit of wine was made, and agreed very nearly with the account given in by Mr. HOOKE in writing concerning it.

Dr.

Dr. MERRET shewed some oil of vitriol frozen, and keeping a sharp taste.

Sir ROBERT MORAY mentioned, upon the authority of Monf. HUYGENS, an experiment of infrigidating luke-warm water; which, according to that writer's description, was first seen to contract itself into a less room, and afterwards to dilate, so as to run over; many great bubbles arising out of the water to the top, and there breaking; which were followed by many little ones, some of which were seen to stick here and there to the sides of the glass.

Mr. HOOKE brought in his account of the diversity of the parts of common water, which was ordered to be registered*, as follows:

" I took common water, and putting it into a retort, I distilled over a small quantity of it with a gentle fire in a sand-furnace: then taking that, which was distilled over, and some of what remained behind in the retort, with a very exact pair of scales, I examined the weight of either apart, and found that, which was come over, somewhat lighter than that which was behind, though the difference were not very great. Then I weighed common water undistilled, and snow-water, that I carefully gathered, melted, and left to cool and settle. And after all, I tried also the weight of some May-dew, and found (after I had diligently examined, that all things requisite to this experiment were in a good order, and that I had made my trials twice or thrice) that the weight of these several liquors were in these proportions to each other:

| | | | | | |
|--------------|---|--------------------------------------|---|---|--|
| " The weight | { | Of common water undistilled | - | - | 124 $\frac{1}{8}$ |
| | | Of the caput mortuum of common water | - | - | |
| | | after distillation | - | - | 124 $\frac{1}{8}$ $\times \frac{7}{8}$ |
| | | Of the spirit or distilled water | - | - | 124 $\frac{4}{8}$ |
| | | Of the May-dew | - | - | 124 $\frac{4}{8}$ |
| | | Of the snow-water | - | - | 124 $\frac{1}{8}$ |

" And this I did after I had found (by equally exposing the liquors to the cool air, and then making trials with a very accurate weather-glass) that the several liquors were very near of the same temperature, as to heat and cold: I say very near, because I found the snow-water, for the most part, somewhat cooler than any of the rest.

" These trials do seem to inform us, either that the parts in common water, before distillation, are of a different subtilty; and that therefore those, which are more light and volatile are, by a more gentle heat, easier raised up into the form of vapours, and carried over the helm: or, that the parts of common water, if uniform and homogeneous before distillation (that is, before they have been by heat transmuted into the form of vapours) are, after distillation, put into another condition; and are altered themselves, as to their magnitude or motion,

* Original Register, vol. ii. p. 22.

“ and so become more light and volatile : or, are put into a new texture, as to one another, and thereby constitute a liquor much more light and porous. Which way soever therefore of these two we incline to, it will seem to hint to us a difference in the constituent parts of common water, as to their greater or less volatility : for since it is generally believed, that a great part of the waters near the surface of the earth deduce its origin from the sky, whence it is imparted to the earth, sometimes in dews, sometimes in mists, rains, fogs, snows, hail, and the like, it will follow, that some of it has suffered a distillation. And because we find, that common water is heavier than either distilled water, snow-water, or dew ; it follows also, that either some parts of it (such as may perhaps be of a sluggish nature themselves, or, though of themselves volatile, may be clogged with saline or terrestrial particles) ; it follows, I say, that some parts have not suffered a distillation ; or have, since their return to the earth, acquired a new constitution, by uniting perhaps with one another, or with some saline and terrestrial parts.

“ In the experiment therefore, where abundance of bubbles are observed to arise out of the water, after the pressure of the air is removed, I see not why the generation of these bubbles may not in part be ascribed to the more subtil parts of the water, which, when the pressure of the air is removed, are able to acquire the form of vapours, by that small heat which is left in the ambient air ; and may, after they have acquired a new texture, have also a power of persisting in it, as was observable in the remaining expansion of spirit of wine, after the pressure of the air was re-admitted, and that of the factitious air generated by the corrosion of iron in Mr. Boyle’s experiments.

“ It is worth the observing further in these experiments, that May-dew, commonly accounted the lightest and most volatile of all waters, is yet, by this experiment, found to be no lighter than common distilled water, and heavier than snow-water ; and it argues somewhat for the former opinion, of the differing of the parts of water as to volatility ; for May-dew, as we have no argument to believe it raised very high, so has it the heat of summer to raise it ; whereas snow, as we are assured it descends sometimes from a considerable height, so it has a more languid heat, viz. that of the winter air, to raise it.”

Mr. Hooke communicated likewise some remarks on the figures in frozen urine, frozen water, and snow ; and those of the small shootings of hoar-frosts ; which were ordered to be registered ^a.

He was appointed curator of three experiments against the next meeting :

1. Of weighing ascending and descending bodies in water.
2. Of weighing some bodies at the top of Westminster-abbey, and at the foot of it.

^a Ibid. p. 59, 69. They are printed in his *Micrographia*, p. 88—93—

3. Of forcing water out of a glass by its own vapours.

Dr. GODDARD's account of his experiment of exhalation raised from water, and returning to water again, was read, and ordered to be registered¹, and was as follows:

"There was taken a spherical glass, containing about a pint, with a short neck: this was placed on a little leaden trivet, with the mouth downward, and tied fast; and then so put into a vessel of water of convenient bigness and depth, with the mouth upward, that it might fill with the water. Then it was turned under water, so that no air could get in, and, with the mouth downward, set with the legs of the trivet on the bottom of the vessel; which was covered, and so all set a boiling on a quick fire as vehement; as might be, without boiling over. Uncovering and looking in, one might perceive the glass to empty by degrees from the top, and after long and vehement boiling, with some difficulty, because of the steams and less transparency of the boiling water, but at certainty one might discern the glass to be wholly or very near empty to the bottom, and the water rising in an hill against the mouth of it; which it suddenly doth upon that cooling, which the uncovering of the vessel occasioneth, and almost filleth the glass; but what remaineth empty, will be long a filling till all be quite cold. The glass was entirely full of water, without any bubble of air; only there was a small heterogeneous matter, not so much as a barley-corn, against the middle of the upper part of the glass, which was not regularly round as a bubble, nor did move upon turning of the glass, but stuck, and appeared to be some little scum or foulness, which the water might gather from the vessel, trivet, &c."

The letter drawn up by Dr. WILKINS, to be sent to Sir WILLIAM PETTY from the society, was read, approved, and ordered to be written fair, and to be dispatched for Ireland by the next post.

Col. TUKE brought in his history of the generation and ordering of green oysters, commonly called Colchester oysters; which was read, and ordered to be registered².

Mr. HOSKINS brought in some inquiries to be sent to Greenland; which were registered³, and are as follows:

"If the cold be as great or greater, between 60 and 70 degrees of north latitude, than between 70 and 80?

"If when wine or beer is frozen, the ice melted affords an insipid watery liquor?

¹ Original Register, vol. ii. p. 63.
Roy. Soc. p. 307.

² P. 76.

³ Ibid. p. 64. It is printed in Dr. SPRAT's Hist. of the

" How deer and other beaſts do to live, while the ground is covered with ſnow?

" Whether the ice, that ſometimes troubles the ſhips, be ſea-water or river-water frozen; and whence it comes driven by winds, and carried by currents?

" How they dreſs the ſkins of beaſts, fiſh, and fowl, with hairs and feathers on?

" Whether they have obſerved the ſame variation to be there now, as in former times? and if not, what difference?

" That they try the water-glaſs?

" What time the ſun riſeth and ſetteth apparently?"

He was likewiſe deſired to collect ſome for Iceland againſt the next meeting; to which ſhould be added a ſcaled up thermometer, to mark the degree of cold in that country above that of England.

Dr. CHARLTON promiſed to communicate to the next meeting his obſervations upon the ordering of wines.

Mr. WILDE was deſired to add his obſervations upon the ſame ſubject.

Dr. MERRET'S obſervations on it were read, and ordered to be regiſtered^a; and were as follow:

" The myſtery of wines conſiſts in the making and meliorating of natural wines. Melioration is either of ſound or vicious wines. Sound wines are bettered, 1ſt, by preſerving; 2dly, timely fining; 3dly, by mending colour, ſmell, or taſte.

" To preſerve wines, care muſt be taken, that after the preſſing they may ferment well; for without fermentation they become qually, *i. e.* cloudy, thick, and duſky; and will never fine of themſelves, as other wines do; and when they are fined by art, they muſt be ſpeedily ſpent, or elſe they will become qually again, and then by no art recoverable.

" The principal impediments of the fermentation of wines, after preſſing the grapes, are either their unripeneneſs when gathered, or the mixture of rain-water with them, as in wet vintages; or elſe through the addition of water to rich grapes. The Spaniards uſe *gieſſo*, to help the fermentation of their Canary wines.

" To preſerve Spaniſh wines, and chiefly Canary, and thereof principally that that which is racy, which will not keep ſo long, they make a layer of grapes

^a Original Regiſter, vol. ii. p. 67.

" and

“ and giesſo, whereby it acquires a better durance and taſte, and a white colour,
 “ moſt pleaſing to the Engliſh.

“ Racy wine, ſo called, becauſe it comes from Rheniſh wine ſlips, ſometimes
 “ renewed. The grape of this wine is fleſhy, yielding but a little juice.

“ French and Rheniſh wines are chiefly and commonly preſerved by the match,
 “ thus uſed at Dort in Holland : Take of brimſtone twenty or thirty pounds, caſt
 “ into it melted, ſpices, as cloves, cinnamon, mace, ginger, and coriander ſeeds ;
 “ and ſome, to ſave charges, uſe the relick of the hippocras bag ; and having
 “ mixed theſe well with the brimſtone, they draw through this mixture, long,
 “ ſquare, narrow pieces of canvas ; which pieces, thus drawn through the ſaid
 “ mixture, they light, and put into the veſſel at the bung-hole, and preſently ſtop
 “ it cloſe. Great care is to be had in proportioning the brimſtone to the quantity
 “ and quality of the wine ; for too much makes it rough. This ſmoking keeps
 “ the wine long white and good, and gives it a pleaſant taſte.

“ There is another way for French and Rheniſh wine, *viz.* firing it : it is done
 “ in a ſtove, or elſe a good fire made round about the veſſels, which will gape
 “ wide, yet the wine runs not out. It will boil, and afterward may be ſoon
 “ racked.

“ Secondly, for timely fining of wines. All wines in the muſt are more opacous
 “ and cloudy. Good wine ſoon fines, and the groſs lees ſettle quickly ; and alſo
 “ the flying lees, of themſelves, in time. When the groſs lees are ſettled, they
 “ draw off the wine, called racking. The uſual times for racking are Midſum-
 “ mer and Alhallowtide.

“ The praſtice of the Dutch and Engliſh, to rid the wine of the flying lees
 “ ſpeedily, and which ſerves moſt for French and Spaniſh wine, is thus performed :
 “ Take of iſinglaſs half a pound, ſteep it in half a pint of the hardeſt French
 “ wine that can be got, ſo that the wine may fully cover it ; let them then ſtand
 “ twenty-four hours ; then pull and beat the iſinglaſs to pieces, and add more
 “ wine, and four times a day ſqueeze it to a gelly, and as it thickens add more
 “ wine. When it is fully and perfectly gellied, take a pint or quart to a hogſhead,
 “ and ſo proportionably. Then over-draw three or four gallons of that wine you
 “ intend to fine, which mix well with the ſaid quantity of gelly ; then put this
 “ mixture to the piece of the wine, and beat it with a ſtaff, and fill it top-full.
 “ Note, that French wine muſt be bunged up very cloſe, but not the Spaniſh ;
 “ and that iſinglaſs raiſeth the lees to the top of ſtrong wines, but in weaker pre-
 “ cipitateth it to the bottom.

“ They mend the colour of ſound clarets, by adding thereto red wine,
 “ tent, or Alicant ; or by an infuſion of turnſole, made in two or three gallons
 “ of the wine ; and then putting it into the veſſel, to be then (being well ſtop-
 “ ped, rolled for a quarter of an hour. This infuſion is ſometimes twice or thrice
 “ repeated, according as more colour is to be added to the wine. Some three
 “ hours

“ hours infusion of the turnsole is sufficient, but then it must be rubbed and wringed. What turnsole is, see the notes on the art of glaſs.

“ Claret over red, is amended with the addition of white wine.

“ White wines coming over ſound, but brown, are thus remedied : Take of alabaſter powder, over-draw the hoghead three or four gallons, then put this powder into the bung, and ſtir and beat it with a ſtaff, and fill it top-full. The more the wine is ſtirred, the finer it will come upon the lee, that is, the finer it will be.

“ To colour ſack white : Take of white ſtarch two pounds, of milk two gallons ; boil them together two hours ; when cold, beat them well with an handful of white ſalt, and then put them into a clean and ſweet but, beating them well with a ſtaff ; and the wine will be pure and white.

“ One pound of the forementioned gelly of iſing glaſs takes away the brownneſs of French and Spaniſh wines, mixed with two or three gallons of wine ; according as it is brown and ſtrong, more or leſs to be uſed. Then over-draw the piece of wine about eight gallons, and uſe the rod ; and then fill the veſſel full, and in a day or two it will fine and be white, and mend it if qually.

“ The firſt buds on *ribes nigra* infuſed in wines, eſpecially Rheniſh, makes it diuretic, and more fragrant in ſmell and taſte ; and ſo doth clary. The inconvenience is, that the wine becomes more heady ; a ſecret remedy whereof are elder-flowers added to the clary ; which alſo better the fragrancy thereof, as is manifeſt in elder-vinegar : but theſe flowers are apt to make the wine ropy.

“ To help brown Malaga’s and Spaniſh wines : Take powder of orris-roots and ſaltpetre, of each four ounces ; the whites of eight eggs ; whereto add as much ſalt as will make a brine ; put this mixture into the wine, and mix them with a ſtaff.

“ To meliorate muddy and tawny clarets : Take of rain-water two pints, the yolks of eight eggs, ſalt a handful ; beat them well, let them ſtand ſix hours before you put them into the caſk ; then uſe the rod, and in three days it will come to itſelf.

“ To amend the taſte and ſmell of Malaga : Take of the beſt almonds four pounds, make therewith, and with a ſufficient quantity of the wine to be cured, an emulſion ; then take the whites and yolks of twelve eggs ; beat them together with ſalt a handful, put them into the pipe, uſing the rod.

“ To amend the ſmell and taſte of French and Rheniſh, which are ſoul : Take to an auln of the wine, of honey one pound, elder-flowers a handful, orris-powder an ounce, one nutmeg, a few cloves ; boil them in a ſufficient quantity
“ of

“ of the wine to be cured, to the consumption of half; when it is cold, strain
 “ and use it with the rod. Some add a little salt. If the wine be sweet enough,
 “ add of spirit of wine one pound to a hogthead, and give the cask a strong scent.
 “ Spirit of wine makes any wine brisk, and fines it without the former mixture.

“ A lee of the ashes of vine branches, viz. a quart to a pipe, being beaten in the
 “ wine, cures the ropishness of it; and so infallibly doth a lee of oaken ashes.
 “ For Spanish rosy wine; rack it from its lees into a new scented cask, then take
 “ of allum one pound, orris-roots powdered half a pound; beat them well into
 “ the wine with a staff. Some add fine and well-dried sand, put warm to the
 “ wine. If the wine, besides, prove brown, add three pottles of milk to a pipe.
 “ *Alias*, the spawn cures rosy wine, used before it begins to fret.

“ Herrings roes preserve any stum wine.

“ To order Rhenish wines when fretting: Commonly in June that wine begins
 “ to ferment and grow sick; then have a special care not to disturb it, either by
 “ removing, filling the vessel, or giving it vent; only open the bung, which cover
 “ with a slate, and as often as the slate is foul, clean it and the bung from
 “ their filth; and when the fermentation is past, which you shall know by applying
 “ your ear to the vessel, then give it rest ten or twelve days, that the
 “ grosser lees may settle; then rack it into a fresh scented cask.

“ This mixture meliorates vicious wines, both in smell and taste, especially
 “ French: Take of the best honey one part, of rain-water two parts, and one
 “ third of sound old wine of the same kind; boil them on a gentle fire to a third
 “ part, scumming them often with a clean scummer; to which purpose they have
 “ a pail of fair water standing by to rince it in; then put this mixture hot into
 “ a vessel of fit capacity, and let it stand unbunged till cool. Some, to better
 “ this, put in a bag of spices. This mixture, called by the Dutch *Soet*, will
 “ serve also to fine any wine, new or old. 2dly, It will mend the hard taste of
 “ wine *i. e.* putting a gallon thereof to a hogthead, and using the rod, and then
 “ let it rest five or six days at the least: but if mild enough, add white mustard-
 “ seed bruised.

“ To mend and preserve the colour of clarets: Take red beet roots a sufficient
 “ quantity, scrape them clean, and cut them into small pieces, then boil them in
 “ a sufficient quantity of the same wine, to the consumption of a third part; scum
 “ it well, and when cool, decant off what is clear, and use the rod.

“ *Alias*: Take of the wine and honey of each two pounds, rain-water a pottle,
 “ twelve beet-roots, ripe mulberries four or five handfuls; boil them to half, and
 “ when cool, decant, &c. *ut supra*.

“ To preserve claret racked from its lees: Take, to a tierce, ten eggs, make
 “ a small hole in the top of the shells, then put them into the wine, and all will
 “ be consumed.

“ To

“ To prevent souring of French wines : Take grains of paradise, *q. s.* heat them in a pan, and hang them, or put them loose into a vessel. Some use lavender tops.

“ To help four French wine : Take of the best wheat four ounces, boiled in fair water till it break, and when cold put it into a vat, in a bag, and use the rod. *Alias*, Take five or six cinnamon canes, bung them up well.

“ To help Spanish four wine : First rack the wine into a clean cask, and fill it up with two or three gallons of water, and add thereto of burnt chalk four ounces, and after three or four days it must be racked and filled up again with rain-water, if the first time doth not do it. Some use loam or plaistering ; if these ingredients make the wine bitter, correct the fault with nutmegs and cloves.

“ To help stinking wines : Take ginger half an ounce, zedoary two drachms, powder and boil them up in a pottle of good wine, which put scalding hot into the vat, bung it up, and let it lie. The species of diambra and diamofchu dulce do the same ; and so nutmegs and cloves, which also give a kind of raciness.

“ To help wine, that hath an ill savour from the lees : First rack it into a clean cask, and, if red or claret, give it a fresh lee of the same kind ; then take of cloves, ginger, and cinnamon two ounces, orris-root four ounces, powder them grossly, hang them in a bag, and taste the wine once in three days, and when it is amended, take out the bag. Some do it thus : Take of cloves half a pound, mastic, ginger, cubebs, of each two ounces, spica nardi three drachms, orris-root half a pound ; make thereof a very fine powder, which put loose into the vat, and use the rod ; then make a good fire before it.

“ Firing of wines, in Germany, is thus performed. They have in some vaults three or four stoves, which they heat very hot ; others make fires almost before every vat ; by this means the must fermenteth with that vehemency, that the wine appears between the staves : when this ebullition and fermentation and working ceaseth, let the wine stand some days, and then rack it. This firing is only used in cold years, when the wine falls out green.

“ Stum is nothing else but pure wine kept from fretting, by often racking and matching it in clean vessels and strongly scented, *i. e.* new matched, by means whereof it becomes as clear, or clearer, than any other wine, preserving itself from both its lees by precipitation of them. But if through neglect it once frets, it becomes good wine. The bung of the vessel must be continually stopt, and the vessels strong, lest they break. A little stum put to wine decayed makes it ferment a-fresh, and gives life and sweetness thereto ; but offends the head and stomach, torments the guts, and is apt to cause looseness, and some say barrenness in women.

“ To fine wine presently. Fill a cask with shavings or chips of beech or oak, which are best. This is to be done with much art, or else it seldom hits right,
“ but

“ but lasteth long : put these chips into a cask, which is called by the Dutch *een spaen*, i. e. a chip, into which they pour in as much wine as the cask will hold, and in twenty-four hours the wine will be fine. Or a quart of vinegar in three days will fine a hoghead of wine.

“ To fet old wine a fretting, being deadish and dull in taste : Take of stum two gallons to a hoghead, put it hot upon the wine, then set a pan of fire before the hoghead, which will then ferment till all the sweetness of the stum is communicated to the wine, which thereby becomes brisk and pleasant. Some use this stumming at any time, some in August only ; when the wine hath a disposition to fret of itself, more or less stum to be added, as the wine requires.

“ The best time to rack wine is the decrease of the moon, and when the wine is free from fretting ; the wind being at north-east or north-west, and not at south, the sky serene, free from thunder and lightning.

“ Another match for French clarets and Spanish wines : Take orris roots, mastic and brimstone, of each four ounces, cloves two ounces, ordering it *ut supra* in matching wines. This will serve for all wines, adding, if you please, nutmegs, ginger, cinnamon, and other spices. Double the quantity of orris root is to be used for Spanish wines.

“ To help Malaga's, which will not fine : Take crude tartar powdered, sifted, and dried two pounds, mix it with the whites of six eggs : dry, powder, and sift them again ; then overdraw the pipe, as much as will serve to mix with this powder, and fill the pipe therewith, beating it with a staff, as before, and this wine will be fine in ten days.

“ Another speedy way to fine French wines : Hang a piece of scent in the cask, and when it is burnt out, put in a pint of the best spirit of wine, and stir it about. Some add a little salt well dried. This fines the wine in twenty-four hours.

“ To keep must a year : Take must, put it into a cask pitched within and without, half full, stop the bung close with mortar. Others sew the cask in skins, and sink it for thirty days into a well or river ; or else a garland of *polium montanum* hung in the vessel ; or rub the inside of the vessel with cheese. All these preserve Rhenish must ; as the *Scoliaft on Dodoneus* in Dutch.

“ Allum, put into a hog's bladder, keeps wine from turning flat, faint or brown ; and beaten with the whites of eggs, removes its ropishness.

“ Flat wines recover with spirit of wine, raisins, and sugar or molosses ; and facks, by drawing them on fresh lees.

“ Our wine coopers of later times use vast quantities of sugar and molosses to all sorts of wines, to make them drink brisk and sparkling, and to give them
Vol. I. Y spirit,

" spirit, as also to mend their bad tastes; all which raisins and cute and stum perform.

" Country vintners feed their fretting wines with raw beef; and here their Canaries with Malaga, which is added more or less to all Canaries.

" The composition of wines is manifold, the vintners usually drawing out of two or three casks for one pint, to accommodate it to the palate of thole, that drink it: most of the Canary is made with Malaga and Xeres sack.

" I shall conclude with two common compounded wines, muscadine and hippocras: the former usually made with thirty gallons of cute (which is wine boiled to the consumption of half) to a but of wine, or the lees and droppings boiled and clarified: its flavour is made of coriander-seeds prepared, and shavings of cypress wood. Some, instead of cute, make it of sugar, molasses and honey, or mix them with the cute. The following is an hippocras of my own making, and the best I have tasted:

" Take of cardamums, carpobalsamum, of each half an ounce; coriander-seeds prepared, nutmegs, ginger, of each two ounces; cloves two drams; bruise and infuse them forty-eight hours in Xeres and white wine of each a gallon, often stirring them; then add thereto of milk three pints; strain through an hippocras bag, and sweeten it with a pound of sugar-candy."

Dr. MERRET reported, that the experiment brought in at the preceding meeting by Mr. OLDENBURG out of Gallendus, concerning the firm freezing of ice upon wood with some salt put upon the top of the ice, had been since made by him, and found true.

Sir ROBERT MORAY promised to communicate an account of the method of brewing ale and beer in Scotland; and proposed, that the whole history of malting, and brewing all sorts of ale and beer might be considered. Whereupon Mr. HILL mentioned one Mr. PHILIPS as versed in this subject, and fit to serve the society herein; after proof of which he might be propounded as a candidate.

Sir ANDREW KING was proposed as a candidate by Mr. GRAUNT.

Dr. CHARLTON informed the society, that Mr. CREW intended to present them with an eagle embalmed after his manner; and that the parrot, which he was desired to embalm, was not so fit to be well done.

Mr. WINTHROP shewed the society some Indian corn, some grains of which were bluish, promised to give them in writing the history of ordering it in the West-Indies.

He shewed also the tail of a rattle-snake, which, he said, increased every year by one ring; whence the people concluded the age. Dr. MERRET took it home with him, to make some trial of the powder of it. Dr.

Dr. CROUNE acquainted the society with Dr. COLLINS's* offer to correspond with them from Russia; and he was desired to entertain that correspondence, and to peruse OLEARIUS for inquiries to be recommended to Dr. COLLINS.

December 24. Mr. CHARLES HOWARD was proposed candidate by Col. TUKY, and was presently chosen; his desire being to be rather admitted by scrutiny, than by the privilege of his birth.

Sir ANDREW KING was likewise elected into the society.

The experiment of weighing ascending and descending bodies in water, and another of driving water out of a glass by its own vapours, were made before the society by Mr. HOOKE; who also brought in the following account in writing of the latter, which was ordered to be registered.

"In prosecution of Dr. GODDARD's experiment, brought in December 17, 1662, I tried with small bolt-heads blown in the flame of a lamp, and (though with much trouble) I made a shift to seal up some, after I had driven out the water by the vapours. One of these, after it was quite cold, I broke under water, and found it filled almost full, leaving but a small bubble of air at the top, which bubble remained constantly in the form of air, and did not vanish. I drew out the water likewise out of others, and letting them cool, I always found, that there was left a pretty big bubble of air in the head, which remained so, though I left them standing with their necks in the water for three or four days; but they seemed a little decreased. I tried the bigness of one of these bubbles, and found it, by a very exact pair of scales, to be the 312th part of the whole content of the bolt-head. The bubbles I guess may be generated partly from the water rarefied by heat, and partly from the sudden removal of the pressure of the air after the glass begins to cool, which makes the water rush in with a most admirable violence: I say partly from this last way, because making trial with an open jar inverted into a skillet of water, I found the bubble of air left at the top, by guess, not so big in proportion to the contents of the jar, as the former were in respect of the bolt-head."

He was desired to communicate an account of the experiment of weighing ascending and descending bodies, at the next meeting.

He gave in the following account of the experiment concerning the decrease of gravity, by removing the body farther from the surface of the earth upwards: which was ordered to be registered.

"In prosecution of my lord VERULAM's experiment concerning the decrease of gravity, the farther a body is removed below the surface of the earth, I made

* SAMUEL COLLINS, M. D. educated in King's College, Cambridge, of which he was fellow, as he was afterwards of New College in Oxford, where he was incorporated doctor of physic May

17, 1650, resided at the court of the Czar of Muscovy nine years, and published *The history of the present state of Russia*, at London 1671, in 8vo.

* Original Register, vol. ii. p. 80. † Ibid. p. 78.

trial, whether any such difference in the weight of bodies could be found by their nearer or farther removal from that surface upwards. To this end I took a pair of exact scales and weights, and went to a convenient place upon Westminster-Abbey, where was a perpendicular height above the leads of a subjacent building, which by measure I found threecore and eleven foot. Here counterpoising a piece of iron (which weighed about sixteen ounces troy) and packthread enough to reach from the top to the bottom, I found the counterpoise to be of troy-weight seventeen ounces and thirty grains. Then letting down the iron by the thread, till it almost touched the subjacent leads, I tried what alteration there had happened as to its weight, and found, that the iron preponderated the former counterpoise somewhat more than ten grains. Then drawing up the iron and thread with all the diligence possibly I could, that it might neither get nor lose any thing by touching the perpendicular wall, I found by putting the iron and packthread again into its scale, that it kept its last equilibrium; and therefore concluded, that it had not received any sensible difference of weight from its nearness to or distance from the earth. I repeated the trial in the same place, but found, that it had not altered its equilibrium (as in the first trial) neither at the bottom, nor after I had drawn it up again; which made me guess, that the first preponderating of the scale was from the moisture of the air, or the like, that had stuck to the string, and so made it heavier. In pursuance of this experiment, I removed to another place of the Abbey, that was just the same distance from the ground, that the former was from the leads; and upon repeating the trial there with the former diligence, I found not any sensible alteration of the equilibrium, either before or after I had drawn it up; which farther confirmed me, that the first alteration proceeded from some other accident, and not from the differing gravity of the same body.

" I think therefore it were very desirable, from the determination of Dr. Power's trials, wherein he found such difference of weight, that it were examined by such as have opportunity, first, what difference there is in the density and pressure of the air, and what of that condensation or gravity may be ascribed to the differing degrees of heat and cold at the top and bottom, which may be easily tried with a common weatherglass and a sealed-up thermometer: for the thermometer will shew what of the change is to be ascribed to heat and cold, and the weatherglass will shew the differing condensation. Next, for the knowing, whether this alteration of gravity proceed from the density and gravity of the ambient air, it would be requisite to make use of some very light body, extended into large dimensions, such as a large globe of glass carefully stoppt, that no air may get in or out: for if the alteration proceeded from the magnetical attraction of the parts of the earth, the ball will lose but a sixteenth part of its weight (supposing a lump of glass held the same proportion, that Dr. Power found in brass) but if it proceed from the density of the air, it may lose half, or perhaps more. Further, it were very desirable, that the current of the air in that place were observed, as Sir ROBERT MORAY intimated the last day. Fourthly, I think it were worth trial to counterpoise a light and heavy body one against another above, and to carry down the scales and them to the bottom, and observe what happens. Fifthly, it were desirable, that trials were made, by the letting down of
" other

“ other both heavier and lighter bodies, as lead, quicksilver, gold, stones, wood, liquors, animal substances, and the like. Sixthly, it were to be wished, that trial were made, how that gravitation does decrease with the descent of the body, that is, by making trial, how much the body grows lighter at every ten or twenty foot distance. These trials, if accurately made, would afford a great help to guesses at the cause of this strange phenomenon.”

Sir ROBERT MORAY and Mr. BRUCE made several relations of accidents, which happened in coal-mines; and were desired to give them in writing.

Dr. CROUNE mentioned, that common water being carried to the Indies, and some of it brought back, flamed, when the vessel, wherein it was contained, was opened.

Mr. BRUCE and Mr. PELL were desired to bring in the description of the several wind-mills and water-mills, which they had observed in Holland and other parts, in order that it might be considered, how and wherein these engines shorten labour.

Dr. MERRET was desired to make the experiment mentioned by Sir ROBERT MORAY out of ZUCCHIUS⁹, concerning the contraction and dilatation in freezing water.

Dr. CHARLETON was desired to deliver in Dr. MERRET's papers concerning the ordering of wines, to be copied by the amanuensis.

Mr. HOSKYNs communicated his *Inquiries* to be sent to Iceland, which were ordered to be registered¹, and were as follows:

“ What sorts of minerals, besides brimstone, are digged up near *Hecla*, or the other burning mountains?

“ Whether in or near *Hecla* there be holes, which, if a stone be thrown into them, throw it back again; and that in many places about the hill there will often break out green flames; and whether fire breaks out of the sea?

“ Whether there be seen in baths, whose heat is not sufferable by one's hand, divedoppers swimming up and down?

“ Whether there be a well, whose water is poisonous, and kills presently, being drank; and what minerals it may proceed from?

“ Whether their meat only dried keeps as well as that which is salted?

“ On the west side of the isle is said to be a lake always smoaking, though cold; into which if wood be thrown, it turns it to stone; but if the wood be thrust

⁹ NICOLAUS ZUCCHIUS, a jesuit, born at Parma, who flourished about the year 1651. ¹ Original Register, vol. ii. p. 77.

“ into.

" into the mud, that part, that was in the water, is stone; but what is in the mud,
 " is like iron in sight and hardness, but in the fire it burns.

" Near a place called *Hafnford* is said to be a deep pit, into which if a stone be
 " thrown, it is a long while falling, but after some time water boils out at top.

" Near the middle of the isle is said to be a lake, that kills the birds, that fly
 " over it.

" Whether it be true, that they sell winds, or converse with spirits, or often see
 " them?

" What is said there concerning raining mice?"

Dr. GODDARD, Dr. WILKINS, and Sir ROBERT MORAY were desired to bring
 in at the next meeting the experiment of LINUS about the sticking of the finger to
 the tube, that is less than 29 $\frac{1}{2}$ inches.

JOHN AUBREY, esq; was proposed as a candidate by Dr. CHARLETON.

Dr. POPE was desired to make the diagram in great relating to Monsieur HUY-
 GENS's Latin letter to Sir ROBERT MORAY, in answer to Mr. HOBBS's defence of
 his geometrical problems*.

Mr. WINTHROP shewed an earth, brought by him out of New England, which
 swam for about half an hour, and then sunk to the bottom.

December 31. Mr. CHARLES HOWARD was admitted.

Sir ROBERT MORAY and Mr. BRUCE promised to bring in writing their relation
 of coal-mines and wind-mills at the next meeting.

Mr. PELL promised to give an account in writing of his observations about wind-
 mills as soon as he could.

Dr. GODDARD gave an account of the mercurial experiment of LINUS, which
 had been recommended to him, Sir ROBERT MORAY, and Dr. WILKINS, it being
 made by himself in private, and before the society, where the lord viscount
 Brouncker likewise made it twice; and all the trials agreed in this, that, con-
 trary to what Monsieur HUYGENS expected, the finger stuck fast to the tube of mer-
 cury: the particulars of which Dr. GODDARD promised to give in writing.

Dr. CHARLETON had leave to keep for a fortnight Dr. MERRET's and Mr. WILDE's
 observations concerning the ordering of wines, in order to compare them with his
 own, to reduce them all into one body, and to return them to the society.

* Letter-book, vol. i. p. 72.

Monsieur HUYGENS's letter to Sir ROBERT MORAY was read, containing his answer to Mr. HOBBS's defence of certain geometrical problems about the duplication of the cube, &c. And it was ordered to be sent to Mr. HOBBS by the means of the stationer appointed by himself to receive the judgments of foreign mathematicians concerning that matter.

WILLIAM NEILE, esq; was proposed as a candidate by Sir ROBERT MORAY.

Dr. MERRET gave some account of the freezing of stinking salt-water, viz. that the ice of it being thawed, retained its saltness, though somewhat refracted; but had quite lost its stink. He was desired to be mindful of the other experiments of freezing recommended to him.

Mr. BOYLE was also desired to communicate his experiments of frost, which he promised to do at his first convenience.

Mr. HOOKE made again the experiment of weighing ascending and descending bodies in water, but in another manner; and was desired to bring to the next meeting an account of it in writing.

Mr. WILD promised to communicate an account of ferments.

Mr. GRAUNT delivered the extracts of two letters from Sir WILLIAM PETTY.

Mr. HOOKE proposed the following experiments to be made at the next meeting, viz.

1. To shew the difference in the refraction of warm water and cold;
2. The difference in the weight of warm water and cold;
3. The living of insects in condensed air.

To which he added, a suggestion concerning the rarifying of chimnies, or the ways of ordering the combustible materials so, as that with a smaller consumption of the fuel, a greater heat may be given, than is done by the common ways yet in use.

Mr. PELL mentioned an observation concerning the figure of the weight hung to a pendulum-clock, viz. that a less weight of a long figure will make a pendulum-clock to go, as well as a greater weight of a round figure.

Sir ROBERT MORAY mentioned the use of black-lead in engines instead of oil.

Mr. WINTHROP remarked, that there was no right black-lead any where except in England and New England.

He

He delivered in an account of maize or Indian corn, which was ordered to be registered'.

1662. *January 3.* The president wrote in favour of the society the following letter to the duke of ORMONDE, lord lieutenant of Ireland.

" MY LORD,

January 3, 1662.

" I am desired by the Royal Society in their names to entreat your grace's favour and countenance in the effectual settlement of the fractions of adventures, arrears, lands &c. which by the act for the better execution of his majesty's gracious declaration &c. were vested in his majesty, in trust for, and the better to enable his majesty to grant the same to them, so as his majesty being their founder, might also be their chief benefactor. In pursuance whereof his majesty was pleased, by his private letters under his own hand in October last, to commend the same unto you: and thereafter some, in the behalf of the clergy of that kingdom, made their application unto his majesty for the same: But his majesty well remembering his promise to grant the same to the society, was pleased to put a stop unto those addresses, and by his letters in the same month of October last, under his royal signet, was further graciously pleased to direct your grace to pass a grant of the said fractions unto Mr. ROBERT BOYLE and Sir ROBERT MORAY for the use of the said society. And understanding, that afterwards Sir ALLEN BRODERICK, Colonel WILLIAM LEGGE, and Mr. HENRY COVENTRY, without informing his majesty of the interest of the society, have procured letters to your grace to pass grants of the said fractions unto them, contrary unto the end, for which the same were originally designed, and his majesty's gracious intentions; the society being much troubled thereat, and fearing, that the same might have been absolutely passed the seal there before your grace could have been informed of the truth of the case, nothing doubting but that as you have been an eminent favourer to the society in their foundation, you will be so far from obstructing or diverting his majesty's bounty or favour unto them, that you will contribute your interest to make the same effectual, much more where the interest of private persons, though very deserving, comes in competition with the public concern of a society, whose designs, if protected and assisted by authority, may so much conduce to the greatness and honour of their prince, the real good of his dominions, and the universal benefit of mankind, and more especially, where their right and pretensions unto the thing in question are every way more just and considerable than theirs, who would endeavour to gain the same of their hands.

" To prevent which, it was desired, that Sir HENRY BENNET would procure his majesty's letter unto your grace, to put a stop unto the said grants, until his majesty were fully informed of the case, wherein he was not so forward as was desired: and therefore it was thought fit to acquaint the council of the said society therewith, who desired me and others of the society to solicit his ma-

¹ Original Register, vol. ii. p. 81.

² Supplement to the Letter-books, vol. i. p. 142.

" jefty, not only to put a stop unto former grants, but also for an absolute grant
 " of all the said fractions to the use of the said society; which was accordingly
 " done in an open and public way; and furthermore desired his majesty, if he were
 " not fully satisfied in the case, that he would advise and consider of the preten-
 " sions of all parties before his council. Whereupon his majesty, after a week's
 " consideration thereof, was graciously pleased to sign the grant, of which I have
 " herewith sent your grace a copy, until the original can be transmitted.

" And as the society has so far tasted of his majesty's justice and favour, they
 " are very confident, that your grace will not only in all things cause the same to
 " be effectually executed to the advantage of the society, but also in all other their
 " concerns continue your favour unto them, so as they may encounter no
 " other difficulties; whereby they may be the better enabled to effect those ends,
 " for which his majesty was pleased to incorporate them.

" I am, my LORD,

" Your Grace's most obedient,

" and humble servant,

" BROUNCKER, P. R. S."

Sir WILLIAM PETTY, who was then in Ireland, was desired to make a calculation of these fractions of adventures, &c. which he accordingly did, but did not send the society the result of it, in regard *that interest was past before by patent unto some others*, as he mentioned to Sir ROBERT SOUTHWELL, when the latter desired him, in the name of several of the most eminent members of the society, to send over to them his calculation. Sir WILLIAM accordingly communicated it to Sir ROBERT, whose letter to Mr. OLDENBURG, dated at Dublin May 15, 1663, containing it, is still extant*.

January 7. Mr. BRUCE brought in an account of wind-mills in Holland; which was ordered to be registered*.

Mr. BRUCE was desired to procure from his friend in Holland a more particular description of these mills and their fabric.

Mr. PELL took these papers of Mr. BRUCE with him, and promised to add to them his own observations concerning mills.

Sir ROBERT MORAY's paper about the way of making malt in Scotland was read, and ordered to be registered*. It was as follows:

" Malt is there made of none other kind of grain but barley, whereof there are
 " two kinds; the one having four rows of grains in the ear, the other two. The
 " first is the more commonly used, but the other makes the best malt.

* In a collection of letters given by HENRY MILES, D. D. F. R. S. to the Royal Society. * Original Register, vol. ii. p. 93. * Ibid. p. 95.

VOL. I.

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“ The more recently that barley has been thrasht, it will make the better malt. If it hath been thrasht six weeks or upwards, it will not prove good malt, unless it be kept in an equal temper, whereof it readily fails, especially if it be kept up against a wall : for that, which lies in the middle of the heap, is freshest ; that, which lies on the outside and at the top, is overdried ; that, which is next the wall, shoots forth ; and that, which is at the bottom, rots. So that when it comes to be made into malt, that which is spoiled does not come well (as they call it) that is, gets never that right mellow temper malt ought to have, and so spoils all the rest : for some grains come well, some not at all, some half, and some too much.

“ The best way to preserve thrasht barley long in good temper, is not to separate its chaff from it. But as long as it is unthrasht, it is always good. Brewers use to keep their barley in large rooms on boarded floors, laid about a foot in depth, and to turn it over now and then with scoops, to preserve it from spoiling.

“ Barley, that hath been overheated in the stacks or barn, before it be separated from the straw, will never prove good for malt, nor any other use : but though it heat a little after it is thrasht, and kept in the chaff, it will rather be the better for it than the worse, for then it will come the sooner, and more equally.

“ A mixture of barley, that grew in several grounds, proves never good malt, because it comes not equally.

“ The best barley therefore to make malt of is that, which grows in one field, and is kept and thrasht together.

“ Take then good barley, newly thrasht, and we'l purged from the chaff, and put eight bolls, that is some six English quarters of it at least, in a trough of stone, where let it infuse till the water be of a bright redish colour ; which will be about three days, more or less, according to the moistness or dryness, smallness or bigness of the grain, season of the year, or temper of the weather. In summer malt does not make well at all : in winter it will need longer infusion than in the spring or autumn ; and in frosty weather, longer than after a thaw. You may know when it is steeped enough, by other ways and marks besides the colour of the water ; as by the excessive swelling of the grain or too much softness when one crushes it, if it be over steeped ; which otherwise, when it is in the right temper, will be like that barley, which is prepared to make broth of, or that kind of barley called by some *orge mondé*.

“ When the barley is sufficiently steeped, take it out of the trough, and lay it on heaps to let the water drain from it. Then after two or three hours turn it over with a scoop, and lay it in a new heap some twenty or twenty-four inches deep : this they call the coming heap ; and in the managing of this heap aright, lies the greatest skill. In this heap it will lie forty-eight hours more or less, accord-

ing

"ing to the forementioned qualities of the grain, before it come to the right temper of malt : which that it may all do equally, is most to be desired.

"While it lies in this heap, it is to be carefully lookt to after the first fifteen or sixteen hours ; for about that time the grains will begin to put forth at the end, that taketh root, which when they have equally and fully done, the malt must within an hour after be turned over with a scoop ; otherwise the grains will begin to put forth at the other end too, which by all means must be prevented ; else the malt will be so spoiled, that no art will make good ale of it, neither as to pleasantness of taste nor strength.

"But if all the malt comes not equally, because that, which lies in the middle, being warmest will come first, turn it over so as the outmost may be laid inmost, and so let it lie till all become alike.

"As soon as you find the malt sufficiently come, turn it over, and spread it to a depth not exceeding five or six inches ; and by that time it is all spread out, begin and turn it over and over again three or four times ; afterwards turn it over in like manner once in four or five hours, making the heap thicker by degrees, and continuing so to do constantly for the space of forty-eight hours at least. This turning of it over frequently, cools, dries, and deads the grain ; so that it becomes mellow, melts easily when it is brewed, and separates entirely then from the husks.

"Then throw up the malt into a heap as high as you can, where let it lie till it grow as hot as your hand can endure it ; which usually comes to pass in some thirty hours space. This gives the malt that sweetness, that it ought to have, and contributes to perfect the mellowness thereof.

"After the malt is sufficiently heated, throw it out and scatter it so as to cool it, and turn it over again some six or eight hours after, and then try it upon the kiln to dry ; where after one fire, which must serve for twenty-four hours, give it another slower, and a third, if need be. For if the malt be not thoroughly dried, it cannot be well ground, it will not dissolve well in the brewing, and the ale it makes will be red, bitter, and will not keep.

"The best fuel is peat, the next charcoal made of pit-coal, or cinders, then heath : broom and furzes are naught. And if there be not enough of one kind, burn the best first, for that gives the strongest impression as to the taste."

Upon reading this paper several ways were mentioned of drying malt, viz. with straw, by the sun, &c. It was also suggested, that since in the West-Indies they brew beer out of bread made of maiz, a like trial might be made with barley, as also with maiz ; and Mr. WINTHROP was desired to be curator of this experiment, as soon as he could be provided with this material.

The lord viscount BRUNCKER was reminded of making the experiment of proportioning bodies of different matter and bulk, to fall in the same time; Monsr. HUYGENS affirming, that a ball of cork may be so big, as to fall with equal swiftness through the air as a ball of iron.

Dr. WILKINS mentioned the prosecution of the experiments of compressing water; and it was objected, that nothing could be concluded from those experiments with respect to what was intended by them, since the vessels, wherein they are made, will retch.

JAMES lord ANNESLY was proposed as a candidate by Sir JAMES SHAEN, and immediately elected by ballot, his lordship waving to come in by the privilege of his birth.

Mr. AUBREY and Mr. NEILE were elected.

Mr. HOOKE made two of the experiments proposed by him at the preceding meeting, viz. that of the difference of the weight of warm and cold water; and that of the difference of refraction in warm and cold water: which latter he was desired to repeat at the next meeting, when he was also to make the experiment of the living of insects in condensed air; and to bring in an account of all in writing.

He gave in his account of some trials for finding how much the pressure of water is increased by the descent of heavier, or the ascent of lighter bodies therein: the reading of which was deferred till the next meeting.

He was directed to shew the society the way of making, with a lamp, coloured glass out of white glass.

A letter was read, written by Mr. BEAL to Mr. OLDENBURG, dated Dec. 21, 1662*, containing an overture of propagating cider-fruit all over England by the influence of the society. Whereupon a committee was appointed to consider of this matter, and to meet for that purpose at Mr. CHARLES HOWARD's lodgings at Arundel-house, on the Monday following, at ten in the morning; and to make a report to the society. The persons nominated of this committee were, Mr. HOWARD, Mr. BOYLE, Mr. BRERETON, Sir ROBERT MORAY, Mr. HENSHAW, Mr. EVELYN, Mr. BALLE, Col. TUKE, Dr. WHISTLER, Dr. GODDARD, Dr. MERRET, and Mr. OLDENBURG; of whom any three were to be a quorum.

It was ordered, that Mr. BEAL should be thanked by Mr. OLDENBURG for his respect to the society, and acquainted, how acceptable his proposition was to them, and what they had begun to do in order to the promoting of his design; as also, that they had declared him, from that time, an honorary member of the society, and would receive him, upon his desire, a fellow of it.

* Supplement to the Letter-books, vol. 1. p. 165.

Mr. Hooke propofed two experiments for the next meeting, *viz.* 1. Of the force of defcending bodies from different heights : 2. Of comprreffing air by quick-filver.

He defired again, that thofe members, who were acquainted with the ways of ordering fewel to the beft advantage, might bring in an account thereof, in order, that, upon confideration of what had been done hitherto in that matter, it might be farther confidered how to improve it. Whereupon, feveral members fuggelted what came into their minds.

Mr. HOWARD mentioned a way of roafting in a very fhort time, with bafing the meat with flames of lard poured upon it : Dr. WILKINS that of boiling and ftewing meat with lamps : Mr. HOSKYNs, that of roafting many pieces of meat with a fiery globe of plated iron ftanding in the middle : Sir CYRILL WYCHE, that of keeping water and other things warm in a double pot, feparated by an interftice : Sir ROBERT MORAY and Dr. GODDARD, that of brewing beer in a kettle, having only a brafs bottom, and in the middle thereof a globe of brafs, open at the lower end, into which the fire goes, whereby the brafs of the reft of the kettle is faved : And Mr. BALLE, that of boiling water in a hogfhead, by a copper globe, without a neck, put in a furnace heated with fea-coal.

Dr. GODDARD promifed to bring the account of the adhefion of the finger to the tube in the mercurial experiment.

Mr. SCHROTER's paper, on the way of increafing of falt-petre in great quantities, was read, and ordered to be regiftred *, as follows :

" Firft, there muft be made an arch about four foot high, as wide as you like
" it, and the thicknefs of the wall on the top about two ftones thick.

2. " The lime of that wall muft be made of thefe ingredients, *viz.* take three
" parts of lime, being quenched with rain-water that falls with the north wind ;
" three parts of fheeps dung, and one part of fheeps urine ; then mingle thefe
" thing, well together, and ftrew coarfe falt upon, and temper it thoroughly with
" falt.

3. " The top of that arch muft be covered with the beft falt-petre earth, and
" that muft be watered with fuch rain-water as afore-mentioned, mingled with
" fheeps urine, or falt-petre lee : and this muft be done every fourteenth night,
" *viz.* after the moon is new.

1. " You may make a garden upon it, and, *pro forma*, plant upon it what
" you pleafe.

2. The field-ftones ferve for that purpofe better than bricks, becaufe of their
" narrow jointing.

* Original Regifter, vol. ii. p. 98.

3. " To

3. " To gather sheep's urine is easy to be done, when the stable is boarded, and hanging downward.

January 14. The lord ANNESLEY and Mr. NEILE were admitted.

Dr. GODDARD's account of the experiment of the tube and quicksilver was read, and ordered to be registered^b, as follows :

" A tube of glass, of so wide a bore as might conveniently be stopped with the finger's end, and about three foot in length, was let down erect into a vessel of quicksilver of sufficient depth to float it in that posture, and so supported from inclining to any side, as left withal at liberty to perpendicular descent : then a mark was affixed at the lower extremity of the part borne above the surface of the quicksilver : after being taken up, and the end that had been immersed being close stopped with the finger, it was filled with quicksilver, and then the upper end being also close stopped with the finger or thumb of the other hand, being carried erect, the former end was immersed under the surface of the quicksilver, and the finger stopping it taken away ; and so the tube being kept close stopped at the upper end, was warily let down to the bottom of the vessel containing the quicksilver. After all, the tube did stick so fast to the finger or thumb stopping the upper end, as to be lifted thereby some inches above the mark of its immersion, and sometimes it was lifted quite out of the quicksilver in the vessel.

" And whereas it was suggested, that a tube of a lesser bore than those, with which the experiments were made, so ordered, would rise precisely to the mark of the immersion (the former being raised higher, by the advantage of the pulp of the finger forced farther into the upper end) it was found indeed much more difficult to raise it at all (the skin and grain of the finger not so closely complying and touching in all parts, when applied to a smaller bore) and tho' sticking firmly at the first raising, yet it would fall off before it could be raised to the mark of immersion before mentioned.

Mr. HOOKE's two papers were read, the one containing an account of some trials for finding how much the pressure of the water is increased by the descent of heavier, or the ascent of lighter bodies therein ; the other, containing an experiment concerning the different weight of cold and warm water : both which papers were ordered to be registered^c. The latter was as follows :

" A small bolt-head of glass being, by water put into the hollow of it, so poised, that it was but a little lighter than water, was afterwards, at the small end, sealed up hermetically. Then being put into a glass of cold pump water, it remained suspended at the top of the water ; and being thrust down to the bot-

^b Original Register. v.1 ii p. 225.

servations, p. 14—18. and the latter is registered, p. 103.

^c The former is registered, p. 99. and printed in Dr. HOOKE's Philosoph. Experiments and Ob-

" tom,

“ tom, it would of itself quickly ascend again to the top, and there remain. This
 “ glafs of water being fet by the fire, whereby the water began to be warm, the
 “ ball, within the fpace of a minute, began to defend, and fo continued, till it
 “ came to the middle of the glafs; where (the glafs being at that time removed
 “ from the fire, and placed upon a table in the room) it remained fufpended. So
 “ that if it were by a ftick depressed below, or raifed above, that middle place
 “ of the glafs, it would, being let alone, return to it again, till the water again
 “ growing colder, it began to re-afcend to the top of the water, the place from
 “ whence it at firft defended.

“ The reafons of which phenomena feem to be thefe; that the parts of water
 “ are, by the action of heat, diflipated, and put into a more loofe and rarefied
 “ conftitution: fo that the fame parts in this conftitution, filling a greater fpace
 “ than they did when left acted on by heat, make up, by confequence, a lighter
 “ body, and fo are not able to bear up the ball of glafs, as they were before
 “ that expansion.

“ That thofe parts of water, which are heated by the fire, being rarefied, and
 “ confequently made lighter than the others that are not fo much heated, are by
 “ the colder, and confequently heavier parts of the water, thruft up to the top;
 “ fo that the lighter and hotter being always protruded to the top by the heavier
 “ and defending cold ones, which keep near the bottom; thefe are too heavy
 “ to let the ball fink into them, and the upper too light to bear it up; whence the
 “ ball remains fufpended in the middle, till by degrees the heat in the water de-
 “ caying, the rarefied parts of the water relapfe to the clofer and heavier texture,
 “ and fo bear up the ball to the top of the water.

“ The ufes of this experiment may be fome fuch as thefe:

“ Firft for profit: This might have hinted to a confiderate man fuch an in-
 “ vention, as is publifhed by GLAUBER, of making a bath or ftove in a wooden
 “ vefiel, by the help of fome fmall copper (or other metalline) retort, or fuch-like
 “ body, which will endure the fire. For fince that body is kept in a great hear,
 “ and the neck of it is inferted in the bottom of the tub; it is clear, that as faft
 “ as the water is heated in it, it muft be driven out of it, and carried to the top
 “ of the water in the tub, by the colder parts of the water, which thruft them-
 “ felves into its place; whence there arifing a continual circulation of the hotter
 “ and colder parts of the water, the fire being continued about the metalline retort
 “ or body, will quickly heat all the parts of the water in the tub, to almoft the
 “ fame degree with that in the retort. This contrivance, if profecuted, might
 “ perhaps be very beneficial to brewers, dyers, and fuch other trades, as have oc-
 “ cafion to make ufe of great quantities of water heated; as was lately intimated
 “ by Dr. GODDARD.

“ Next for pleafure and curiofity: This may afford us fome hints; as firft, of
 “ a way of making a weather-glafs, whereby the heat and cold of the feafons of
 “ the year may be very pleafantly exhibited by the afcending and defending of
 “ feveral

“several bodies, differently poised and shaped into the forms of various animals, as men, birds, beasts, fishes, reptiles, or the like. And secondly, it may afford us a hint of making perhaps a natural perpetual motion; for supposing there was a round hollow ring, or some kind of glass pipe, so bent, that it might return into itself (like the Egyptian hieroglyphic of the year) that had a passage clear round it, so as that a liquor might circulate, without being wasted or leaked out; there might be caused a perpetual circulating motion of a liquor, that should almost fill that pipe; if by any means it can be contrived to keep one side of that pipe hotter than the other; which would be quickly done, if there can be in nature found two liquors or bodies, whereof the one is ever hotter than the other: for in that side of the pipe, which is inclosed by the hotter medium, the liquor will be ever ascending; and in the opposite, always descending. This will hold in most liquors, and most conspicuously in air; of which I shall have occasion to say more on another subject. Thirdly, it hints a way of poisoning a body in the midst of a vessel of water; which may likewise be done, by impregnating water with salt; for the saltiest and heaviest part of water will subside and remain at the bottom, and that water, which swims at the top, will be much lighter and fresher.

“A third use of this experiment may be for caution: For it may hint a thing perhaps worth inquiry, Whether ships, that pass from the northern or polar seas, to those that lie near the torrid zone, will endure to be laden so deep, as they may for a contrary voyage; since the waters there being hotter, and consequently more rarefied, are not able to bear so great a loading, if this lightness of the water be not counterpoised with the greater abundance of salt, which the hotter water may be impregnated with.

“A fourth use of it may be for conjecture: For, to speak hypothetically, it may be supposed, that the vast space of the vortex of the sun or the heavens, wherein the sun, earth, and planets are contained and moved, may be filled with a fluid body, whose parts are of different densities, according as they are nearer or farther from the great fire of the world, the sun, which may be placed in or near the center of that space, according to the Copernican hypothesis. Next it may be supposed, that the several bodies of the planets and earth may be hollow like so many glass bubbles; and though they appear much more massy than the ambient æther, they may, perhaps, as to their whole bulk, be in an *æquipondium* to the ambient fluid. And so, according as they are more or less massy, they may take their several stations in the fluid æther. Some, such as γ , δ , being lighter, may be in an *æquipondium* with the æther near the sun; others, whose crusts may be thicker, and so more massy, as b , u , &c. may be in an *æquipondium* with the æther farther distant from the sun. And, had I time, I think there is no affection of the planets, but might be illustrated by circumstances of this experiment.”

The committee appointed at the last meeting for the considering of Mr. BEAL's proposition for the propagating of cider-fruit made a report, that they had met according to order, and considered the said proposition, and agreed, 1st, That this business

business should be recommended to all the members of the society, that as many of them, as had conveniency, might fall upon the work themselves; and that those, who had none, might endeavour to persuade their friends in the country, who had such conveniency, to promote this work. 2dly, That Mr. BEAL should be desired to send up grafts and seeds, and directions for ordering them; as also to publish some paper, which might excite persons to the work; and to acquaint the society what experience he had of the drawing of aquavita in good quantity out of cherries, plums, elder-berries, &c.

Mr. HOWARD, Mr. BRERETON, Col. TUKE, Dr. WILKINS, Dr. HOLDER, Mr. EVELYN, Mr. HENSHAW, Mr. HOSKYNs, &c. engaged to take off some of the grafts to be sent up, and to convey them to their friends for propagation.

Mr. HOOKE made the experiment of condensing air by the pressure of water; but the trial not agreeing with the hypothesis, it was ordered to be repeated at the next meeting.

He made an experiment of the force of falling bodies to raise a weight; but was ordered to try it by himself, and then to shew it again in public.

Dr. MERRET suggested an experiment of keeping two weather-glasses, one in a cellar, the other abroad, to see whether it be colder in cellars in winter than in summer. He was desired to make the trial, Mr. HOOKE furnishing him with weather-glasses.

Dr. MERRET mentioned an experiment of ZUCCHIUS, proving, that there is really an unequal temper in cellars, with respect to heat and cold, in summer and winter.

Sir ROBERT MORAY and Mr. HOSKYNs related the way of making the burning balls at Liege, &c. which is a thrifty kind of fewel, lasting long, and burning without smoke, and leaving no ashes.

Sir PAUL NEILE suggested, that the practice of this thriftiness would prove prejudicial to shipping.

Mr. HOOKE was ordered to consider of the several ways of ordering fewel, that had been suggested, in order to make an improvement thereof.

Sir ROBERT MORAY communicated an account of the persons killed with subterraneous damps; which was ordered to be registered^a, and was as follows:

“ In a coal-pit belonging to the lord SINCLAIR in Scotland, where the coal is some eighteen or twenty foot thick, and antiently wafsted to a great depth, the colliers about some three weeks ago, having wrought as deep as they could, and

^a Original Register. vol. ii. p. 107.

ing to remove into new rooms (as they call them) did, by taking from the pillars, which support the roof and earth over it, so much weaken them, that within a short space after they were gone out of the pit, the pillars falling, the earth above them filled up the whole space, where the colliers had lately wrought, with its ruins. The colliers being hereby out of work, some of them adventured to work so near the old wastes, that striking through that slender partition of the coal-wall, that separated between them and the place where they used to work, they quickly perceived their error; and fearing to be stifled by the bad air, that they knew possessed these old wastes, in regard not only of the damps, which such wastes do usually afford, but also there having for many years been a fire in these wastes, that filled them with stifling vapours, retired immediately, and saved themselves from the eruptions of the damp. But next day, some seven or eight of them came no sooner so far down the stairs, that led them to the place, where they had been the day before, as they then intended, but upon their stepping into the place, where the air was infected, they fell down dead as if they had been shot. And there being amongst them one, whose wife was informed he was stifled in that place, she went down so far without inconvenience, that seeing her husband near her, she ventured to go to him; but being choaked by the damp as soon as she came near him, she fell down dead by him.

"This story I had from the earl of WEYMES, brother-in-law to the lord SINCLAIR, as it was written to him from Scotland."

Mr. VERMUYDEN mentioned a method used for the reviving of men suffocated in the coal-mines, by putting their heads into fresh earth; and was desirous to give the account thereof in writing; as also of his other observations made concerning coal-mines, and the accidents therein.

Mr. WINTHROP observed, that a ship built in New England was lately arrived here; and he was desirous to bring in an account of the shape and size of it.

He was likewise reminded of the Indian bread and malt.

Mr. VERMUYDEN and Mr. STANHOPE mentioned, that the Greenland men do not load their ships so deep in the Greenland seas as they might, because they were apprehensive of sinking, when they should come more southward. It was queried, whether they did this upon the account of thinner and lighter water, or from fear of foul weather.

Mr. STANHOPE, Mr. HOSKYNs, and Mr. HOOKE * were desirous to draw up some inquiries concerning the said particular of loading ships in Greenland, in order to be sent with the fleet going thither.

The lord viscount Brouncker was put in mind of his experiment concerning the measure of the first velocity of bodies.

* Mr. Hooke's inquiries for Greenland are printed in his *Philosophical experiments and observations*, p. 18, 19.

Mr.

Mr. Hooke proposed to bring in at the next meeting the following experiments :

1. Of the living of insects in condensed air.
2. Of the force of falling bodies.
3. Of respiration.
4. Of the different refractions in cold and warm water.

January 21. Mr. AUBREY was admitted.

Mr. BEAL's letter to the president was read ; in which he acknowledged the favour of the society in receiving him as an honorary member, and engaged his zeal and activity for their service. Whereupon he was elected a fellow of the society, at his farther desire.

An order was made for demanding the arrears of the weekly payments, and for advancing the remainder of the present quarter.

Mr. EVELYN was desired to read over and digest Mr. BEAL's papers lately sent to Mr. OLDENBURG concerning the propagation of cider, together with directions and encouragement for the same, in order to their being printed.

Mr. HOSKYNs was desired to engage in the same work with the lord viscount SCUDAMORE and his own father, Mr. BEAL having particularly recommended these two persons for it.

The lord viscount BROWNER, Dr. WILKINS, and Dr. HOLDER promised to engage their friends in this business of cider.

Mr. Hooke made an experiment of condensing air by water ; of which he was ordered to bring in an account in writing at the next meeting.

The president suggested, that it was to be considered in this experiment, whether the compression of air was made by the weight of the water only ? or whether the coldness thereof did contribute to it ?

His lordship proposed likewise, that it might be tried, whether the compression in the same experiment holds exactly by 20, 40, 60, 80, or not ?

Mr. Hooke shewed the scheme of an instrument for making the experiment of the force of falling bodies ; which was ordered to be made against the next meeting.

He made a trial with a bladder, how long the same air would serve for respiration without the supply of fresh air ; and he found, that it served for five inspirations, though with difficulty. He was ordered to try it again, but with a glass ; and to bring in the account thereof in writing.

Dr. MERRET acquainted the society, that he had received an information from Naples, concerning a person, who had an art of keeping new-born infants alive, without respiration, for a good while. It was thought very desirable to have a farther inquiry made into this matter, both as to the truth of the fact, and the way

of performing it, viz. whether it was done by hindering the closure of the *foramen ovale*, which is supposed to be shut soon after the birth of the animal.

Dr. MERRET mentioned several instances of divers living a good while under water without respiration; and he was desir'd to bring an account of them in writing.

Mr. BOYLE observed, that he had kept a viper alive under water for five hours; and mov'd, that the lungs of amphibious animals, and particularly of frogs and tortoises, might be carefully dissected, and the structure thereof well observ'd.

He took notice, that swallows live under frozen water in the Baltic sea.

Dr. CROUNE suggested an experiment of keeping a new-cast puppy in warm milk, to see how long it would live so without air. He was desir'd to be curator of this experiment, and to remember the experiment, with which he had been formerly charg'd, of making a carp live for a good while in the air.

Mr. HOOKE's inquiries for Iceland were read, and order'd to be register'd¹, and recommended by Col. TUBE to the Danish lord, who was lately ambassador in England, and gave the society a visit.

Dr. CROUNE mov'd, that some English water might be sent to the East-Indies, to try, whether, at its return, it would yield an inflammable spirit. It was order'd, that a copy of the inquiries for the East-India voyages should be given to him; and that this experiment suggested by him be added to them.

Mr. PELL was desir'd to peruse the same inquiries, and to consider, what observable things might be added to them.

Mr. GRAUNT read Sir WILLIAM PETTY's letter, giving a farther account of Sir WILLIAM's new ship; and Mr. GRAUNT was desir'd to give an extract of it.

Mr. HOOKE propos'd an experiment against the next meeting of shutting up an animal and a candle together in a vessel, to see whether they would die at the same time or not.

January 28. Mr. HOOKE made the experiment of shutting up in an oblong glass a burning lamp and a chick; and the lamp went out within two minutes, the chick remaining alive, and lively enough.

He brought in an account of some trials for finding the pressure of the parts of water upon one another, and the elastic power of the air: which was read, and order'd to be register'd², as follows:

¹ Original Register, vol. ii. p. 108. These inquiries are printed with some variation in Dr. Hooke's *Philos. experiments and observations*, p. 19—22.

² Register, p. 112.

“ For

“ For the making these experiments, there was prepared a long glass tube, sealed at one end; which being erected perpendicularly, with the sealed end downward, was filled with water, and so fastened against a wall. Then there was taken another tube of glass, which was twelve inches long in the cavity of it, and was sealed at one end, was divided into inches and half inches, was small enough to pass to and fro in the cavity of the former tube, and was very equally and evenly drawn. Then to the open end of this was tied a small long plummet, heavy enough to sink this pipe to the bottom of the longer tube. And to the other end of this small tube was tied a string, by which it was let down or drawn up, as there was occasion. These things being in a readiness, the pipe being held by the string (and not touched with the hand, because of rarefying the air) was let down gently into the water; and as it descended, the water in the small pipe began to arise, and so increased the lower it descended. The degrees, by which it got into the small tube, according to the several depths it descended to under the water, at Gresham College, were these: The water rose half an inch, that is, the 24 half inches of water were contracted to 23 half inches of space, when the under-surface of that air was below the surface of the water 20 inches; to 22 when 37 inches under, to 21 when 58, to 20 when 79; which being a fifth part of a cylinder of water, able to counterbalance the pressure of the air, the whole cylinder may hypothetically be concluded to be near 395 inches, that is about 33 foot.

“ I did, since that, erect a tube, some thirteen foot long, and fitting all things
 48 00 } “ as in the former experiment, I collected this table A, whose first
 47 08 $\frac{1}{2}$ } “ row of numbers shews the equal spaces, into which the air was
 46 17 } “ extended, and the last shews the height of the water above the
 45 27 } “ under surface of the air. Since that, in the same tube, standing
 44 36 } “ in the same place, I reiterated the experiment, and collected this
 43 45 $\frac{1}{2}$ } “ following table B; which three observations being so different one
 42 58 } A “ from another, may seem to overthrow each other, and the cer-
 41 68 $\frac{1}{2}$ } tainty of this kind of experiment in general. But as I cannot vin-
 40 80 } dicate the trial from being guilty of some errors, it being almost
 39 91 $\frac{1}{2}$ } “ impossible to make these trials so accurate, but that there will be
 38 105 $\frac{1}{2}$ } “ some mistake committed (for the error of a hair's breadth in the
 37 117 } “ smaller pipe may make an error of some inches in the longer);
 36 130 $\frac{1}{2}$ } “ as I say I cannot vindicate them, so neither do I believe, that
 24 00 } “ these seeming contrarieties do wholly proceed from the unaccu-
 23 13 } rateness in the process: for since the common air is sometimes
 22 31 } “ under a greater, sometimes a less degree of pressure, the degrees
 21 52 } “ of force requisite to promote the condensation further must ne-
 20 76 } B “ cessarily be differing.
 19 101 } “ Hence by the first experiment I judge the height of the cylin-
 18 127 } “ der of water able to counterbalance the pressure of the air at that
 17 $\frac{1}{2}$ 142 } “ time to be near 395 inches, that is about 33 foot. By the second,
 “ I judge the counterbalancing pillar then to be between 390 and
 “ 400 inches, or near about 33 foot. By the last, I guess it to be
 “ about 32 foot. “ This

" This experiment therefore, if accurately made at several seasons and times of the year, may afford us a very easy way of knowing the pressure of the air for that time. And this more accurately and nicely, than can be performed with the ordinary way. For whereas the shortning and increase of the mercurial cylinder is at most not above two or three inches, in this experiment the aqueous cylinder will change fourteen times as much.

" Next, this experiment may help us to guess at the pressure of the sea-water against air let down to the bottom of it in a diving-engine, by knowing the proportion between the gravity of salt and fresh-water, and the depth, to which the engine is let down: but yet it were very desirable, that such, as have the opportunity of making trials at sea, would be diligent in it. For though there seems to be no doubt, but that the water there does proportionally press according to its perpendicular height, yet it is not easy to predict, how much it may vary from this hypothesis; which deviation may be caused, either by the extreme cold at the bottom of the sea, which may weaken the spring of the air; or from the differing gravity of the upper and lower parts of the salt-water; or from somewhat else, whereof we may be yet ignorant.

" For the more accurate making of these trials, I think it were requisite to have some such engine as this: Take a good strong glass bottle, that will hold about a gallon, and let there be fitted to it a handsome screw-cover of brass, which may screw very close and tight, that it will not leak water. In the top of this cover let there be made a small hole with a needle-drill, whereby the water may get in, or air get out, as occasion shall require: or, instead of this hole, let there be made a little pipe like that in the figure, whose end may be so turned, as that the hole of it may be open downward. Then hanging a good weight under it, let it sink with the cover upward, to determinate depths, where suffer it to stay for a little space, that the water may be intruded in, as much as the air will suffer it: then drawing up the bottle, and weighing the water it brings up, and repeating the experiments at several depths, it will be easy to give a true account of the pressure of the water at the bottom, without going thither.

There may be many other ways of making this kind of experiment, but this is the most cheap, easy and certain of any I know; nor is there any danger of breaking the bottle either inward or outward. For as the bottle descends, the water rusheth in, and as it is drawn up, the air gets out."

Mention being made in this paper of a diving-glass serving to give a true account of the pressure of water at the bottom of the sea against the air, Mr. Hooke was ordered to try it in Dr. GODDARD's long wooden tube.

Mr. Hooke was ordered likewise to procure a glass to be made, that might serve instead of a bladder, to make the experiment of respiration, viz. how long the same air would serve to breath in, without any supply of fresh air.

He

He was also directed to try, how long fishes will live in the open air, and in a glass full, and exhausted of air.

Dr. CHARLETON remarked, that fishes die by hindering the motion of their gills, by gagging or hooking them, &c. He was desired to shew this by experiment.

Dr. MERRET suggested, that the gills of fishes are to them a supplement to, and do the office of lungs; and added, that the aorta divaricates itself into the gills; and that the water being taken in by fishes at the mouth, is carried out again slimy by the gills. He was desired to demonstrate the circulation of the blood in fishes by some anatomy of a fish.

Mr. MATTHEW WREN gave an account of a carp kept a whole week in a cellar out of the water, and fed with moistened bread, wetting the gills of it once or twice a day.

Dr. CROUNE was put in mind to make this experiment, as he had formerly promised.

Dr. CHARLETON brought in again his *Mystery of the vintners: or, a discourse concerning the several sicknesses of wines, and their respective remedies now commonly used*: which was ordered to be registered¹.

Mr. MATTHEW WREN mentioned, that there was an opportunity of sending the directions for seamen, and the inquiries for the East-Indies; of both which papers the amanuensis was ordered to make a copy against the next meeting. And Mr. WREN was desired to have constantly a copy ready by him, to serve upon occasion.

Mr. HENSHAW offered himself to recommend the inquiries for Iceland to a proper person; upon which he had a copy of them delivered unto him.

Another copy was ordered to be given to Col. TUBE, to be recommended by him to the lord ULEFELD, who had lately been ambassador from the court of Denmark in England.

The report of the committee appointed November 26, 1662, to examine and give in an account of the matter of fact concerning the structure and sailing of Sir WILLIAM PETTY's new ship, was read, and registered¹, as follows:

“ MY LORD,

“ In obedience to an order of the Royal Society, dated the 28th of November last, appointing us to consider, and report the structure and sailing of Sir WILLIAM PETTY's double-bottomed ship; we have proceeded as followeth, viz. The members of the society meeting did, in the first place, issue an or-

¹ Original Register, p. 116. It was printed by him at London 1668, in 8vo. under the title of *Two Philosophical Discourses: the first concerning the*

different sorts of men: the second, concerning the Mystery of Vintners, or a brief discourse, &c.

¹ Register, p. 124.

“ der,

“ der, that as many ingenious gentlemen, especially such as had been most conversant in naval affairs, who were in and near this town, together with the chief shipwrights and seamen of this place, should be desired to meet and confer about the premises, which accordingly was done; and there was an appearance of the several persons undernamed, *viz.*

| | |
|-----------------------------|-------------------|
| “ The lord MASSARENE, | } of the society. |
| “ Sir ANTHONY MORGAN, | |
| “ Dr. PETER PETT, | |
| “ Mr. SOUTHWALL, and | |
| “ Sir WILLIAM PETTY himself | |

| | |
|---------------------------|--------------------------------------|
| “ Together with Dr. WOOD, | Capt. SAMUEL MOLYNEUX, |
| “ Mr. MUSCHAMP, | Capt. WEBBE, |
| “ Mr. TUCKER, | Capt. GLOVER, |
| “ Mr. AMORY, | Mr. BATHURST, |
| “ Mr. PEIRSON, | Mr. FITZGERARD, |
| “ Mr. TAYLOR, | Mr. OSBORNE, |
| “ Mr. LANCELOT, | Mr. WILLIAM PETT, Master shipwright. |

“ At the conference, the structure was first considered; and that as well by example of the draughts propounded for a double-bodied vessel of great burthen and force, as the fabric of that very vessel, which is already built and used by Sir WILLIAM PETTY.

“ Concerning the latter, there are draughts sent you, namely, of the whole in general, and in particular one of the couples or bindings, by which the two bodies are connected; upon the sufficiency whereof the strength of the whole depends, it being practicable to use as many of them as shall appear necessary; although there be but two used in this present fabric, besides some other circumstantial cross beams and strengthenings, which have withal their use each of them respectively.

“ They had before them, besides the draughts herewith sent, an exact model of about 2; foot long of the said present vessel; whereupon most of the company, and especially the seamen, moved several objections concerning her strength and otherwise; but declaring their judgments, that they saw in her the causes of out-failing any thing already in use; and were well satisfied by their own observations, of her keeping a good wind, feeling her helm, staying well, round and quick, without losing way.

“ The chief objections were these, which follow:

1. “ The danger of divulsion and separation of the two cylinders, by the irruption of the water; for as much as the same is received by the two heads, which stand diverging, as in at the wide end of a funnel.
2. “ The falling in of the water between the two heads obliquely.

3. " The danger of being over-run, and submerged by a head-sea, the vessel
" failing swiftly against it; especially when her stern is raised, and consequently
" the head depressed by a wave abaft.

4. " The danger of her platform's being blown up, either by the rising of the
" sea betwixt the cylinders, or rather by the sea's coming in by her broad wind-
" ward side, and cuffing her under the platform; especially when the vessel either
" by her sail keels, or by the windward-sea feels much.

5. " The danger of washing away the men from the platform and deck in a
" tumbling sea, which is often so violent as to wash boats, and sometimes to carry
" away all a ship's upper works.

6. " The wrenching the whole vessel lengthways in a short broken sea.

7. " The rowling her masts by the board, which are very great and taunt,
" considering the smallness of her holding under water.

8. " The windtaughtness of so great a deck, and other habiliments, which far
" exceed what is requisite in the vessels of the ordinary built.

9. " That this vessel was almost laden by her said vast deck, mast, yard, rails,
" with proportionable sails, cables, and anchors, so as there remained little space
" of support for other goods in order to use and service.

" To these preceding conjectural objections, being laid down in the nature of
" guesses, before experiment of what might happen, these following answers were
" after made; which perhaps, without experiment, might be thought conjectural
" likewise: as namely, to the first, he gave these two answers:

1. " That water between the cylinders would void itself, by running away more
" quick than that of the open sea; and by the fast vent thereof opprets but little.

2. " That it passes much away underneath and sideways, besides endways; ei-
" ther of which courses it would take rather than break a far lesser strength than
" is in this contignation.

" To the second objection he gave answers,

1. " As a stone falling obliquely upon water would not pierce it (as in childrens
" ducks and drakes) so water falling obliquely upon stronger bodies, as timber,
" would do little but reflect off again, according to its incidence without much
" wrong.

2. " That as the water thus falling in is so much the stronger as it falls more per-
" pendicularly, so it is so much the less in quantity, none at all falling in perpen-
" dicular as is supposed.

Vol. I.

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3. " What

3. "What force is impressed on the further cylinder, by such an oblique sea, on the inside of its bow, is counterpoised by the like parallel impulse upon the outside of the nearer cylinder.

"To the third objection he gave answers :

1. "This is prevented by the particular fabric of this vessel's head, which is universally approved; for it is so framed, as that looking directly forward upon it, it shews like a cone, whose vertex is in the keel. If you look on it side-ways, it hangs raking, so as to make a greater angle with the level of the sea, than the oblique side of most waves do with the same : so as there will be an angle of void space between the stem of this vessel and the side of the wave, the which must always prevent the evil ; especially since the head being so extreme bluff, and floating aloft, doth more easily take the way of creeping up the side of the wave, than of entering into his body.

2. "The length of the cylinders in short seas never suffers the stem to make so acute an angle with the level of the sea as to cause this danger ; and in growing seas, the waves, though very high and great, are not so steep : so as in both cases they think themselves secure.

"To the fourth objection :

1. "That the level of the sea is $2\frac{1}{2}$ foot from the platform, and the distance of thy cylinders, from inside to inside, is $4\frac{1}{2}$ foot : so as it is not likely, that any wave, whose foot is but $4\frac{1}{2}$ foot broad, should rise up in a cone or prism above $2\frac{1}{2}$ foot high ; in which case, the vertex only would touch the platform, which is nothing. But the sea does wrong, as a hammer of soft metal with a vastly big head ; nor doth it its mischief near so much by the velocity of its motion, as the bigness of its body moved.

2. "As to the sea's coming in her broad windward side, and taking the platform upon a heel underneath it ; he answered, that the sea coming in as a wedge under the inclined platform doth rather level it, helping up the depressed side, than depressing it more.

3. "The incidence of the sea upon the place of the platform will be always on so sharp an angle, that, like the stone in the ducks and drakes, it will rather more forward on, than pierce a soft body in water, or offend a thin body, as boards, well joined and kept down.

"To the fifth objection he answers :

1. "The cause of wrongs of this kind are not by every seaman thoroughly understood ; for, the same sea, that shall carry away a huge ship's upper works, perhaps should not break a hollow egg-shell, or any thin box. Wherefore, to understand this matter, we must take notice, that the superficies of the sea is much more agitated than the same deep down. Nay, as water may be boiling-
"but

“ hot at the top of a vessel, and stark cold below ; so the sea may be in a fret in its superficies, and yet very quiet ten or twelve foot deep. This being granted, the reason is plain, why those great dangers are done to the greatest ships ; namely, because drawing much water, and being difficultly moved sideways, they are held fast by perhaps ten foot of quiet water, which fix of agitated cuffs, and tears, and beats them.

“ To apply this, he said, that this vessel drawing but one foot of water, was all alike in agitated water, and obeyed the whole sea : neither could any wave, twice or thrice as high as the keel was deep, take a run upon the surface of the sea, so much faster than the superficies of the whole sea, that this whole vessel takes up, as to break or disturb a thing treble above the said superficies or surface, more than the keel was below it.

“ To the sixth he answered :

“ That if the seas be shorter than his ship, he riding upon two of them together, or rather three, with both cylinders, does always stand like a three-legged stool upon a very uneven rugged floor.

“ To the seventh, he answered :

“ That as the masts are taunt, so the shrouds spread proportionably, by reason of the great breadth ; and when she rows, she does it more easily, because more slowly ; as long pendulums make their vibrations in greater times than short ones do.

“ To the eighth, he answered :

“ Wind-taughtness, before the wind and large, does do good and not harm ; and men put to sea more when the wind is so, than bare. It is true, that by a wind, it will throw a vessel to leeward ; but he having computed, how much hold in the water is equivalent to any measure of wind-taught, can add this counterpoise upon that, when he is in foul weather to claw it off a lee-shore, and be as she was again, when she shall go before the wind.

2. “ Neither in this vessel was there any necessity of being so wind-taught as indeed she is ; nor shall it be in any hereafter without special reason.

3. “ That she is not leewardly, though wind-taught.

“ To the ninth, he answered :

“ That this vessel being designed for experiments, was designed for no other lading than the several supellex and furniture thereunto : but in the other, it shall be shewed, how the double-bodied vessel shall, upon the whole matter, be more serviceable, even for burthen, than any single is or can be.

B b 2

“ But

“ But of these answers Sir WILLIAM PETTY himself not being very fond, as he seemed not much moved with the objections, he still referred to the experiments, which had been made, not only in several models, but in about thirty expeditions, which the vessel itself had made; sometimes in very grown seas and foul weather, both within and without the bar of Dublin, in all positions of the wind and tides to each other, and in all the degrees of each. Upon which account, he offered, as to the above-mentioned model of his present vessel, not above 2½ foot long, and being no stronger in proportion than his vessel itself is, that even the model should live in any water, natural or artificial, which the objections could find; and itself answer as many of the aforementioned objections, as did relate unto it. And as for the vessel, he offered much testimony, that in all her failings, neither timber or board ever cracked, wound, wrested, bowed, &c. nor pin, or bolt, or nail, ever drawn or shortened; that the pitch of no seam ever broke, nor ockham spewed: so free hath it been from wrong of any kind. Nor have the iron braces been added to the cylinders for any necessity of strength, but merely to prevent fear in the wives and children of his mariners; and they do more harm than good.

“ Having proceeded thus far upon the structure of the present vessel, he proceeded to demonstrate, that one third part of as much materials, as would build the two bodies, would undoubtedly connect them so, as that it shall be equally easy to wrong either in any part of the said bodies, as to threaten separation. He also shewed us draughts of several ways of carpentry, in which he would bestow the said materials; concluding, that half of what would so do it, might competently suffice.

“ In both which matters he profered so well, as that Mr. PETT, the chief shipwright, offered to undertake the performance of it. The seamen also, not so well satisfied with the present structure, did well approve of the whole, as to firmness and usefulness; in all which, every person present at this conference more or less acquiescing, we desist from troubling you farther upon this matter of the structure.

“ But before we shall enter upon the report of the sailing, we shall set down a brief account of some conclusions, with the illustrations and demonstrations, whereof Sir WILLIAM entertained the company, viz.

“ He produced two sticks of fir wood, of an inch square apiece, and fifteen inches long, coupled together in parallel at three inches distance, from inside to inside; and shewed, that no single body of that material and cubical content could move so easily end-ways, so difficultly side-ways, and bear her whole burthen so conveniently, that is, so distant from the center of its magnitude; and, consequently, whose natural site, or trim, or setting upon the water, was so uneasily changed; that is, in words more peculiar to this matter, which would bear so much fail, nor admit so great variety in her lading.

1. “ This

1. " This he did, by comparing the same to four bodies equal and single ones, unto which all others might analogically be referred.
2. " He shewed the experiment, that the water between the cylinders did much help against falling to leeward.
3. " The cylinders were as little leewardly, as parallel sides of equal length and cubical content.
4. " That a prism or wedge would go as well with its head as sharp end foremost; and that when the boat-men tow a mast, they tow it by the great end.
- " Out of all which he laboured to demonstrate the qualities of this vessel *à priori*, in which it excelled the common built.
5. " He composed four other double bodies of equal magnitude (though all alike, yet all rectangular parallelepipeds) and placed at equal distance with each other, and gave in his opinions and conjectures of the commodities and inconveniences of each.
6. " He shewed the reason and ground of the distance, at which he placed the several bodies of each scantling.

" We might here insert the report, that several of the gentlemen there present made of this vessel's sailing upon several occasions; as, that it had out-failed several good vessels half in half, in stiff winds and grown seas, thwart tides; and that it steered and sailed extraordinary well. But the company, for the fuller satisfaction both of themselves and the ROYAL SOCIETY that intrusted them, caused a flag to be made, and have offered it to any; that can win it at a sailing to be made for that purpose on Twelfth-day, and committed it to the seamen and shipwright, to give general notice thereof throughout the harbour; of which contest be pleased to take the following account.

" MY LORD,

" We have sent this relation less whole than it might have been, to avail ourselves of the opportunity by Sir MAURICE BERKLEY: however, as to the truth of all passages, we hereunto subscribe.

" Signed by order,

Dublin, Jan. 5,
1662.

" MASSAREENE.

Report of the sailing of Sir WILLIAM PETTY's ship, on Twelfth-day.

" MY LORD,

" We could not think of a better expedient, to call together all such, who were conversant with boats and the water, than, on a holiday, to propose a match;
" and

“ and to make a free offering (without any danger of loss on their side) of a flag of silk, charged with a gilded harp, and in a wreath of laurel above, and in a scroll beneath, this inscription,

PROEMIUM REGALIS SOCIETATIS VELOCIORI:

“ And this to be given to any boat, that should out-fail Sir WILLIAM PETTY’s vessel, in such a course as should be set. The prize being published, and the day come, the only boats, that would adventure for this reward, and for the day, were but three; for all the rest judged it in vain to contest, where those three did appear. And as we do believe them the prime ones, which this place does afford, so had they amongst them the two advantages of fabric; for it lies in the shipwright’s skill, to make a boat do well in her course before the wind; or to alter that shape, and make her a good sailer by the wind. But both these advantages they cannot, in perfection, unite in any one; the first requiring only a shallow floating in the water; and the other, for fear of being windward, a good deep rooting in it: yet both these advantages Sir WILLIAM affirmed to be in his ship.

“ The company then being in great number assembled, the mark for goal was agreed on by the parties concerned; which was a ship, that rid at anchor, about two miles below the haven. The flag of reward was pitched on a pole at the starting-place, and to be given to the boat, that first failed round that ship, and returned, against the wind, back to take it down. It was then tide of flood, and the wind blew very hard, and that in sudden broken flaws, as they term it.

“ The three boats were, one of them, the king’s open barge; another, a large black pleasure-boat, laden with two tons of ballast; and the third, a man of war’s boat, belonging to captain DARCY.

“ At the sign given, all hoisted sail, and they got the start of Sir WILLIAM’s, and DARCY’s boat kept it by half a score lengths, before the wind, until such time as Sir WILLIAM’s was well settled in her course, and that the men had done running up and down: but then she soon passed them by, and came to the ship near one tenth part of the way before her: so that the tacking round, and taking a great stretch back into the wind out toward the right hand, he could easily perceive, that DARCY’s boat, which also turned round the ship some time after her, was clearly baffled by the wind; she not being able to bear up, nor do any thing against the wind, although she had done very well before it; but her shape of built would not permit this, and therefore they had, by way of stratagem, taken two empty barrels aboard them, with design to take in ballast at sea, and to fill these up, as soon as they came to work against the wind. Yet, notwithstanding, they did so ill, as that they had near two miles to turn when Sir WILLIAM’s vessel did arrive. And it is affirmed, by such as observed their walks, that this first course was run in half a quarter of an hour.

“ We

“ We shall now tell your lordship the adventures of the black boat and the barge: these two, being not shaped to sail with advantage before the wind, were half a mile behind when Sir WILLIAM’s vessel turned round the ship; and therefore, seeing how much she was already on her return, they very fairly, not going home unto the mark, tacked about; and the black boat performed now much better than before. Yet, however, that by ill play she turned so short, Sir WILLIAM’s men would needs try it with her still; and truly she failed up, and came so near the wind, as that, by these following misfortunes, she came to get before them. Sir WILLIAM’s men, for want of dexterity to shift their sails, stopped twice in the wind, and ran back near a quarter of a mile; in one of which errors, one of the rudders was broken; she also grated twice on the shoal ground; and by reason of the sudden flaws of wind, the sheet of the main-sail did sometimes break loose; and the men were yet confounded (in this new way) in the names of the ropes.

“ By these disadvantages, the black boat got to tack about before her, whereof she was so proud, as that making too daringly in the eye of the wind, the violence of it snapt off their boom by the board, and so the cylinders soon passed her by, leaving her to make a pole with the part broken, which helped them to get home by setting.

“ As for the barge, she was distressed by too much wind, and the disorder of her sails did entangle her; so that DARCY’s boat, that failed out the full course, was at a great distance off, labouring in the wind. The barge was near half a mile short, and the black boat could sail no more.

“ So that the præmium was taken down by Sir WILLIAM PETTY’s men; and now they bear it on the main top, as admiral of the cylinders.

“ This is the true state of that day’s expedition; for the better knowledge of which, Mr. SOUTHWELL did then, at the match, sail in her, and does report, that for the strength of her contexture, he never did perceive the least tendency to a divulsion of the cylinders; but that, on the contrary, the waves, that rose up big and strong, fell most softly on them; for their rounded shapes made all the force slide away on each side, so as not to make the least contusion or balfery. And he says, that the objection of her being wind-taught lies much more strongly against her; but for this Sir WILLIAM avouches a perfect remedy; and that greater vessels shall be less subject to it than small ones.

“ As for her sailing against the wind, she does it extremely well; she stops well at a tack; she makes way as she looks, without sinking down the wind; and comes within less than five points of the compass; some say, very much less. And all this we have observed in this present fabric, of the first trial in this built; with which the men that sail in her offer to go where any vessel of double their burden dare venture, she being a ton and three quarters.

“ And

“ And they make another offer, that even now in the winter, with a month’s warning, they will give out twenty pieces here, to receive an hundred at their return from Holyhead. And that no man may urge the scruple of venturing mens lives, Sir WILLIAM faith, that another vessel shall go out with them; and if by the way they at any time call to her for aid, the wager shall be acknowledged lost.

“ MY LORD,

“ Since ours of the 5th instant, we have made the above-mentioned experiment, and do attest to the truth thereof.

Dublin Jan. 14,
1662.

“ Signed by order,

“ MASSAREENE.”

After reading this report Mr. GRAUNT observed, that he had received a letter of a fresher date than that, which contained the above-mentioned report; and that in this letter Sir WILLIAM PETTY mentions, that he had so altered his vessel since, that it would now bear 720 square feet of sail, whereas it carried but 600 before.

Mr. PELL was desired to peruse the inquiries and directions for the East-Indies, and to add such as he should think proper.

Sir ROBERT MORAY having mentioned his having received a letter from Monsieur HUYGENS, it was ordered, that an English translation of it be made against the next meeting, and that the scheme contained in it be drawn in great.

February 4. The experiment of the force of falling bodies was tried; but the instrument used for that purpose being defective, Mr. HOOKE, the curator of this experiment, was ordered to have it better fitted against the next meeting, and then to repeat the experiment.

The experiment of respiring the same air was made, both in a glass immersed in cold water, and in a bag. Mr. BALLE respired in the glass 30 times, Dr. MERRET 36, Mr. HOOKE 13, the operator 56. But here the time was not observed. Then the same was tried in a bag, where Mr. HOOKE respired 19 times in $1\frac{1}{2}$ minute, and Dr. MERRET 76 times in three minutes. It was ordered to be made again at the next meeting, in a glass immersed in warm water.

Dr. MERRET related a story of a caulker, who managed his breath so well under water, as to stay half an hour under it to repair a foundered ship.

Sir ROBERT MORAY moved, that as some of the society intended to go to the Downs, the experiment of condensing air in certain glasses, sunk under sea-water, might be made.

Monsieur HUYGENS's letter to Sir ROBERT MORAY, dated from the Hague, February 2, 166 $\frac{1}{2}$ ⁸, was read; and the experiments mentioned therein, viz. that of the quicksilver sticking to the finger, and that of the not subsiding of water purged from air, were recommended to be made again; the former to Dr. GODDARD, in a cane of a less bore than formerly; the latter to Mr. HOOKE.

Mr. HOOK mentioning, that the refraction of water is greater than that of ice, he was desired to give an account of that experiment in writing.

Dr. CHARLETON moved, that the eyes of some animals might be frozen, in order to see their structure the better; and it was suggested, that this would somewhat vitiate the figure of the eye. In the mean time the operator was ordered to freeze some cats eyes against the next meeting, if the frost should hold.

It was queried, whether eggs, after they have been frozen, continue secund; which those members, who had the conveniency, were desired to try.

Dr. CROUNE mentioned, that he had seen new-laid eggs frozen (though not very hard) without the shells being broken.

He offered to make the experiment set down by BARTHOLINUS *de Nive*, of putting an egg in Rhenish wine, to see whether and how the crystals of tartar gather about the egg.

Mr. PELL, Dr. POPE, and Dr. CROUNE were desired to observe the next eclipse of the moon on the 12th of February 1662, and Dr. CROUNE to write to Dr. POWER to do the same, and the lord viscount BROUNCKER and Sir ROBERT MORAY to observe it at Whitehall.

Dr. CROUNE had the inquiries for the East-Indies, and the directions for seamen, delivered to him to be sent to the East-Indies.

Mr. PELL had a copy of the same to make additions to them.

February 11. An experiment of the refraction of ice was made by Mr. HOOK, and an account of it given by him in writing, which was read, and ordered to be registered¹. He was desired to try it the next day with a glass of the same figure with the piece used by him in the experiment of this day.

The force of falling bodies was tried again, and one ounce falling at the distance of less than half an inch, and somewhat more than a quarter of an inch, moved four ounces. The same weight of one ounce, at the distance of three quarters of an inch, moved eight ounces; at the distance of an inch and a quarter, moved sixteen ounces; at the distance of about an inch and an eighth, did the same; at the

⁸ Entered into the Letter-book, vol. i. p. 29. See also his letter of Feb. 3, 1663, *ibid.* p. 75.

¹ Original Register, vol. ii. p. 149. It is printed in his *Philos. experiments and observ.* p. 24—26.

distance of four inches, it moved sixty-four ounces; and at three inches and a little more, did the same.

Mr. HOOKE was ordered to try this by himself at home, as exactly as might be, and to bring in a written account of it at the next meeting.

Dr. MERRET shewed a glass cane, wherein oil of vitriol was frozen, and contracted into a less room.

He affirmed, that he had seen eggs frozen, yolk and all, without the shells being broken.

He produced a gourd, and a little vessel of box-wood, both burst with freezing: He added, that latin will also burst with freezing.

Some live coals and a chick were shut up in a glass: the chick, after it had been kept in it $2\frac{1}{2}$ minutes, was taken out alive and well; but the coals were extinguished about a minute before.

A letter of Sir WILLIAM PETTY to the lord viscount Brouncker, relating to the farther success of his new ship, was read; and Mr. GRAUNT observed, that in a letter to him from Sir WILLIAM it was mentioned, that the ship went as near the wind, as by Dr. WREN's brass instrument it was possible.

It was ordered, that the secretary write in his own name a letter to Monsieur HEVELIUS of Dantzick, to assure him of the esteem, which the society had of his merits, of which he had given such demonstrations to the learned world in the books published by him.

Dr. POPE was desired to recommend to Dr. WREN from the society the continuance of the observations of the eclipses of Jupiter's satellites; and himself together with Mr. BALLE and Mr. HOOKE to join in the same work.

Dr. CROUNE was desired to try, whether egg-shells attract the tartarous part of wine.

The experiment of the mercurial canes adhering to the finger, according to Monsieur HUYGENS's account of it, was referred to Dr. GODDARD to be made at the next meeting.

The experiment of respiration in warm water was made. The operator respired 16 times in 1' 52"; and Mr. HOOKE 24 or 25 times in 1' 50".

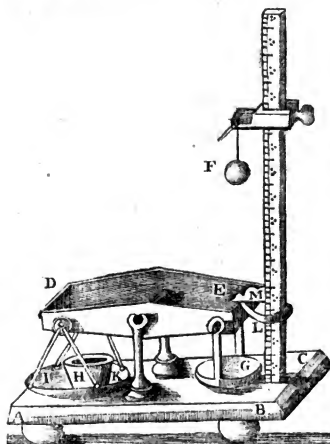
Mr. HOOKE proposed for the next meeting the celerity of falling bodies.

The eclipse of the moon of February 12th. was directed to be observed by as many as had conveniency.

February

February 18. The experiment of the refraction of a prism in water was made by Mr. Hooke; who was ordered to give an account of it in writing.

His account of the force of falling bodies was read, and ordered to be registered^a, and was as follows:



| A | |
|-----|----|
| 4 | 1 |
| 8 | 2 |
| 16 | 4 |
| 32 | 8 |
| 48 | 12 |
| 64 | 16 |
| 96 | 24 |
| 128 | 32 |

“ and letting fall the bullet an inch above the steel plate, I found it to have moved it, and admitted the small spring. I repeated the trials so long, till I found, that letting this ball fall but $\frac{1}{4}$ of an inch above the plate, it would move the beam so as to admit the spring; but if I let it fall from a less height, it would not. Then I put in eight ounces counterpoise, and by several repeated trials, I found $\frac{7}{8}$ of an inch to be the height requisite for the falling bullet to pass before it would move eight times its own weight. I proceeded further, and from the experiments collected the first table A.

“ ABC the pedestal of
“ the scales, DE a double
“ beam, between the two
“ cheeks of which the steel
“ ball F falls from a deter-
“ minate height upon the
“ steel plate G; and if by
“ that fall it moves the
“ double beam and the
“ counterpoise H, lying in
“ the scale I K, it gives the
“ small spring L a free pas-
“ sage to slip between the
“ end of the double beam
“ and the stay M, by which
“ means there is given a
“ certain sign, whether the
“ falling body has moved
“ the scale and counterpoise
“ so far, as to admit the very
“ thin edge of the spring.
“ The rest of the contri-
“ vance is obvious enough
“ from the scheme itself.

“ This instrument being
“ ready, I put into the op-
“ posite scale four ounces,
“ that is four times the
“ weight of the steel bullet,

^a Original Register, vol. ii. p. 151.

“ Afterward I took a small ball of clay, that was very round, and exceeding
 B “ hard (it was in weight very near a quarter of an ounce) and proceed-
 ing with this ball as I had done with the steel, I collected from the
 4 “ several trials a second table B. The first row of numbers of both
 8 “ tables shew the perpendicular height, from which the balls were let
 16 “ fall to move the several counterpoises, which are noted by the second
 32 “ row of numbers in both tables 4, 8, 16, &c. signifying the counter-
 64 “ poise to be 4, 8, 16 times the weight of the ball.
 128

“ Which trials, though they do not answer our expectation as to the ac-
 curate exhibiting the strength of a moved body, yet seem to prove, that a body
 moved with twice the celerity acquires twice the strength, and is able to move
 a body as big again. Nor are the failings in these experiments without some use:
 for it shews us the difficulty of such trials, where, though all things as to our sense
 appear the same, yet I find, that sometimes the ball will move the counterpoise,
 when it is let fall from a less height than is requisite to produce the same effect
 at another. Whence we need not wonder, if often endeavouring to repeat an
 experiment, delivered upon good credit, as done by another, with such and such
 materials, so and so used, though we do all things just according to prescription,
 yet we miss in producing the promised effect. And therefore, I think it not less
 useful to shew, wherein our present trials were deficient, than to declare what
 they succeeded in.

“ One defect therefore in our trials seems to be, that there is a yielding in the
 materials we made use of; as namely, that part of the steel ball, which first
 touched the plain, is a little flattened, and consequently a part of the force is re-
 turned into the ball, and so lost. Next, there is a yielding in the plate itself, and
 the ears of it; every of which yieldings seem to take off from the force of the
 body, that it cannot work the effect so accurately, as it would, were those removed.

“ Next in this contrivance there is, besides the counterpoise of weights, a great
 deal of massy heavy body; namely, the double beam, and the plate and scale;
 all which, or at least the greatest part of it, must be moved; and that with a
 very quick and sudden motion, before the spring (though it be so very thin) can
 get between the end of the beam and stay, so as to make the effect sensible.
 Now this quick motion itself does require a considerable strength to effect it,
 were the counterpoise removed; for such a bulk of body cannot be put into such
 a quick degree of motion, but by another body, moved with a determinate de-
 gree of celerity.

“ Thirdly, the scales and counterpoise may be all moved, and yet the small
 spring not be moved; and though it be so thin, as not to exceed a fortieth or
 fiftieth part of an inch in thickness, yet is that a space; and the beam may per-
 haps be moved half that way, and yet the resistance of gravity may make it re-
 turn before it hath moved the whole space: so that it may be moved a little,
 and yet not so much as to make it sensible by this contrivance. Nor would the
 making the spring thinner much mend the matter; since there are other incon-
 veniencies

"veniences, which could not easily be avoided. And that this is more than a mere conjecture, the following experiment will make manifest: for when by my last trial I found the quarter-ounce ball required to be let fall from the height of 36 inches, to move the end of the beam so as to admit the spring, when the counterpoise was 128 times its weight, that I might try, whether the same ball would not move the same counterpoise, though let fall from a much shorter height, I played the spring so, that it was between the beam and the stay, but not so far as it would spring in if it were left free: then letting fall the ball at four inches height, I found, that it had moved the end sufficiently to let the spring slide in as far as it would. I put the spring again in order as before, and let it fall from three inches and an half, and found it there likewise to have moved the beam. I repeated it again at three inches height; but though I tried it several times, I could not find, that it had at all moved the beam.

"Now as exact trials of this kind may be very useful in mechanics, so could they be made with bodies perfectly solid, would they be for the establishment of one of the chiefest philosophical principles, namely, to shew the strength, which a corpuscule moved has to move another; and though DES CARTES put it as a principle, that *si corpus C planè quiesceret, essetque paulo majus quàm B, quacunq̃ cum celeritate B moveretur versus C, nunquam ipsum C moveret, sed ab eo repelleretur in contrariam partem*: yet these experiments do seem to hint, that the least body by an acquired celerity may be able to remove the greatest; though how much of its motion is imparted to the bigger body, and how much of it is recoiled into the smaller, be not determined by these experiments."

Mr. HOOKE was desired to prosecute this experiment with bullets of the same brass metal to several diameters, and to observe the time withal.

The lord viscount Brouncker was reminded of the experiment formerly recommended to him concerning the first velocity of bodies.

The experiment of the celerity of falling bodies, shewing exactly the time in which they will descend at such and such distances, was ordered to be made by Mr. HOOKE.

The experiment of the mercurial cane of a small bore, to try whether it would adhere to the finger or not, was made; and it was found, that it would stick to the finger, conformably to Monsieur HUYGENS's account. Dr. GODDARD was desired to bring an account of it in writing.

Mr. BALLE, Dr. POPE, and Mr. HOOKE were desired to communicate an account of their several observations of the late eclipse of the moon.

Dr. CROUNE shewed the tartar gathered about egg-shells put in Champagne wine; and related, that there were six grains of this tartarous substance gathered about the egg-shell, out of half a pint of wine, in the space of twenty-four hours. He was desired to try it again, and then to give an account of the whole in writing.

Mr.

Mr. WINTHROP was acquainted, that Dr. GODDARD would afford him the necessary accommodations for the brewing of beer out of bread of maize.

Dr. CHARLETON promised to shew his experiment of killing fishes by gagging them.

Mr. HOOKE was ordered to bring in a scheme of experiments concerning air, both such as had been made already on that subject, and those, which should occur to him farther to be made concerning it.

Mr. COLWALL offered himself to discourse with the governor of the Greenland company, and to procure from him an account of the whale-fishing, and other such things, as occur considerable in that country.

Mr. OLDENBURG acquainted the society with his appointment of a conference with one Mr. GREY, who had been several times in Greenland; and he was desired to take in writing such answers, as the said Mr. GREY should give to his queries; and to communicate them to the society.

Sir ROBERT MORAY mentioned, that it should be considered, whether the Greenlanders might not be assisted with some engine, to shoot their harp-irons into whales with more force and surety.

Mr. HOWARD related a story of strange exhalations in Lancashire, which he was desired to give in writing.

Dr. MERRET shewed a certain membranous substance produced by frost out of blood separated from its serosity. He was desired to add it to his experiments of freezing to be brought in writing.

February 25. Mr. BEAL's letter to the lord viscount Brouncker, dated Feb. 16, 1667, was read; in which he gave some account of the famous hot Baths and the cool springs of Wells, from several descents of Mendip-hills in Somersetshire; and likewise of the strange cave called Wookey-hole in the same county: for the fuller account of which he referred to a letter of Mr. BUCKLAND sent to Mr. OLDENBURG, which was also read, and the contents thereof referred to the farther examination of such members, whose occasions might call them into those parts the next summer, to view and observe the several things mentioned in the said letter. Dr. WILKINS and Mr. BALLE offered their service therein to the society.

Mr. REED was ordered the thanks of the society for his box of cyons of red-streaks, which he sent them; and his offer of sending another supply was accepted.

Mr. HOWARD's relation of a sulphureous vapour issuing out of the earth near Wiggan in Lancashire was read, and ordered to be registered*, as follows:

* Original Register, vol. ii. p. 155.

“ I was

" I was there in the beginning of November, after great rains, which had so filled the grounds with water, that there ran a constant stream in that ditch over the place, where a vapour did arise, which made the water bubble, as if it had been boiling on the fire.

" I held a candle to the vapour, which immediately flamed above two foot high, and seemed to burn not only above, but in the water. After a little while (though with some difficulty) I extinguished the flame, by throwing water upon it : then I gave fire to the vapour again, by a lighted piece of paper, and put it out as before: this I repeated twice or thrice. Then I made a dam above the place, where the vapour rose, to stop the current of the water, and after a little time I perceived some dead leaves, and little pieces of sticks (that were fallen out of the hedge) to burn, notwithstanding the wet dirt, that was mingled with them : then I took a green hazel stick, and put it to the place, which in a little time burnt to ashes.

" Inquiring after the cause, I was informed, that there was a coal-pit under that place, where the vapour did rise, and that one of the coal-diggers searching for his tool with a candle, as soon as he came, where that vapour rose, it flamed immediately ; at which he being very much frightened, he called his fellow-workmen, who put it out by throwing water upon it. Then to satisfy their curiosity they set it on fire again, and extinguished it as before ; till they grew so familiar with this experiment, that they were no more frightened with it.

" I was informed, that Mr. HOTHAM, who was then minister of Wiggan, hearing of this, went to the place, and brought away some water from thence with him ; and having distilled it, he found, that the vapour had not communicated any of its quality to the water. The vapour was visible to me till it was set on fire, with little or no scent ; the colour of the flame not much differing from aquavite, but much hotter. I am confident it would serve very well to boil meat, and might be very proper for many chemical operations."

Several inquiries concerning Greenland, answered by Mr. GREY, who had frequented those parts, were brought in by Mr. OLDENBURG, and ordered to be registered*, and were as follow :

1. " What is the heat of the sun in the midst of summer in Greenland, compared with the heat of it in England ? Answer: When calm weather, it is almost as hot as in England, in 78 degree of latitude, when men are land-locked, and in the harbour, where the hills environ them, and cause the heat by reflection : but without at sea, it is very cold, even in the midst of summer ; especially when the wind blows, or when it is foggy, the sun then not having his power. The hottest time of the year is the latter end of July.

2. " What is there the most constant weather in summer ; whether clear, cloudy, rainy, or foggy ? Answer: Some years the weather is clear and moderate,

* Original Register, vol. ii. p. 156.

“ when the winds hang north-east or east, and do not blow hard ; but some
 “ other years the winds hang southerly and westerly, and then it is foggy and very
 “ cold. Here fall sometimes rain toward the middle of August, and that in the
 “ valleys, but snow on the hills at the same time. At the latter end of May there
 “ is still much snow and great cold, and the sea full of ice about the coast, in
 “ some places twenty, in others thirty or forty miles off at sea from the shore ;
 “ after which time the ice is commonly broke up by strong winds, that beat the sea
 “ with violence against the ice and the frozen coast, and so free it from the same.

3. “ What constancy or inconstancy there is in the winds to this or that quar-
 “ ter of the horizon, or to this or that part of the year ? Answer : In May and
 “ August, the eastern and north-eastern winds blow much : in the other months
 “ they have southern and south-western and north-western winds. But generally
 “ the winds are as various there as here.

4. “ What the temperature of each wind is observed to be ? Answer : The
 “ north and north-east wind coldest, being supposed to blow from a great tract of
 “ land, where are abundance of snowy hills. The east and south-east pretty
 “ warm to those in the harbour, because sheltered by the hills, under which they lie.

5. “ What wind brings most ice ? Answer : The east south-east.

6. “ What currents there are, and which way they set, and how fast ? whether
 “ they always run one way ? Answer : There is but one constant current, which
 “ sets away from the east south-east, and runs up to the north north-east as far as
 “ 77 degrees latitude, where it is check'd ; and from thence sets away again on the
 “ east side of Greenland, between Duke's Cove and Greenland to the south-west ;
 “ and then wheeling about the south point of Greenland, sets up again north north-
 “ westward to the Foreland of 80 degrees latitude : and then from the south end
 “ of the Foreland, it drives away to the west north-west. This current, when
 “ there is much ice upon the coast, is more forcible ; but runs very easy, when
 “ the ice is gone from the coast. It runs always one way.

7. “ What is observable about the tides, spring or neap ? how high the water-
 “ mark is above the low-water ? which way it flows ? which way it ebbs ? what
 “ time of the moon the spring-tides are made in ? Answer : The tides flow from
 “ the north-west to the south-east, and then they ebb back to the north-west.
 “ The spring tides are highest about the sixth tide after the full and change. The
 “ highest tides are but six foot ; in some parts not above three or four foot. The
 “ spring-tides differ from the neap-tides about two foot.

8. “ Whether the ice, that floateth in the sea, be salt-water or fresh ? He answer-
 “ eth, He conceiveth it to be only fresh water, that freezeth ; the cold forcing the
 “ saline parts away from the surface of the water, and the snow falling then upon
 “ it, and chilling the upper part together, which, when it is once skinned over,
 “ abundance of snow falling from time to time upon it, and congeling, thickens
 “ the ice, and at length produceth vast islands of ice. The sea-water there is less
 “ salt than more southward.

9. “ What

9. "What rivers there are in the summer, and what fresh-water can be had?"
 "Answer: There is no other fresh water, than dissolved snow falling from the mountains.

10. "How deep the cold penetrates into the earth?" Answer: Some six or seven foot.

11. "Whether there be any pits or mines?" Answer: He knows of none but some coal-mines, which he had been digging in, not much beneath the surface of the earth.

12. "At what distance they feel the coldness of the ice? and what alteration they find in the air, upon their approach to the ice?" Answer: At the distance of three or four leagues; when they also see a kind of glaring in the air, in the night-time.

13. "What living creatures there be in Greenland?" Answer: For fowl, abundance of geese and ducks, which cover whole islands, and sit as thick, and lay eggs, that you must tread upon them. Besides these there are pigeons, and a sort of fowl called the willock, white-breasted and black-backed, of the bigness of a duck, building his nest upon craggy rocks, good to eat, like in taste to the heart of an ox. There is also some small store of grey partridges, and some cor-morants. For four-footed animals, there are deer, bears, foxes; the deers grey, the bears always white, the foxes, some dun, some white. The bear, where he lights upon most food, there he taketh up his winter-quarters, for which he watcheth on the sea-shore for the carcasses of whales, and carrion of other beasts, coming to shore there, which he drags out, and layeth together for his food. The deer scrape away the snow in the vallies, and under it find some small sustenance. But in summer, when the sun comes there above the horizon, they have good grass, which maketh them very fat before sun-set. The fox feeds upon the fowl, which he betrayeth, by feigning himself dead, and lying all along upon his back, and stretching out his tongue; at which when the silly fowl picketh, becomes his prey. These animals breed the latter end of May.

14. "What vegetables grow there?" Answer: Very few; yet some flowers there are, and among them one, that hath the scent of a fox; and another sort like a round striped bead; and some like dazie: some others yellow and red. No fruit.

15. "Whether there be any thunder or lightning in those parts?" Answer: None, that ever he observed.

16. "How the land trends?" Answer: It lies away south-south-east, and north-north-west.

17. "What fish do most frequent those seas?" Answer: Whales; and a peculiar sort of them called *Jubartes*, that are very long, which they cannot kill, be-
 VOL. I. D d ing

“ing too swift and too strong : besides these, there is the sea-morse, having a lion’s
 “look, and scales ; some salmon also, and a small fish like a smelt, which the fowl
 “pick up.

18. “Whether any people do, or have been known to stay there all the winter ? and how they shifted ? Answ. Once they themselves left there, besides
 “their intention, seven or eight men, that were gone a hunting ; at which time
 “they weighd anchor, and went along the shore, intending to meet them, and
 “take them in at a convenient place : but a wind and a fog arising, which made
 “them lose the sight of land, and forced them to sea, their poor companions
 “were left behind, but found alive at their next return ; having lived upon fowl
 “and deer, and saved themselves from being frozen by the coals they found
 “there.

19. “How near any hath been known to approach the pole ? Answ. He told
 “me, that once he met, upon the coast of Greenland, a Hollander, that swore
 “he had been but half a degree from the pole, shewing him his journal ; which
 “was also attested by his mate ; where they had seen no ice nor land, but all water.
 “This seems incredible.”

Mr. Hooke brought in a scheme of inquiries concerning the air, according to order, which was as follows :

“For the making a history sufficient to direct an able enquirer to find out the
 “true nature of the air, there will be requisite,

“First, A diligent search after, and a collection of all the observations, as well
 “as all the experiments, that have been made, and are any where delivered upon
 “good credit. By which may be had as much of antient and later observation,
 “as those writers have attested to posterity, about the temperature or nature of
 “the air in several ages of the world, and in several parts of the earth.

“Next, A curious and diligent process of making experiments ; wherein a
 “most severe inquiry may be made into all particulars, both of the manner of
 “making the experiment, and of the circumstances observable in any of the effects ;
 “and every of these trials to be repeated twice or thrice at least, and so
 “recorded and ranged into several orders or degrees ; in every of which places
 “they may stand like so many witnesses, to give testimony of this truth, or against
 “that error. And a most severe examination of these witnesses must be made,
 “before a jury can warrantably give their verdict, or a judge pronounce sentence,
 “for branding one proposition or hypothesis as erroneous and absurd, or for establishing
 “another for a truth or axiom.

“Experiments therefore and observations must be made, and those of several
 “kinds, according to the several particulars, that are to be enquired into ; and

Original Register, vol. ii. p. 161.

“those

“ those particulars may, I think, be well enough reduced to three heads, which are these :

First, Of what substance, or of what kind of particles the air consists ? Whether infinitely fluid, or definitely solid ? If solid, whether the interstice between them be vacuity, or replenished with some more subtle and fluid body ? How these particles are formed, or into what shapes they are put, to constitute the body of the air ? How generated ? from what ? by what means ? How preserved and continued in that form of air ? How, and by what means altered and changed ? How it differs from other liquors ?

“ Next, What its quantity or extent is ? Whether boundless upward, or terminated ? And if bounded, How ? Whether with or without a determinate superficies ? If with a superficies, Whether it be spherical, elliptical, or irregular ? How high that superficies, or the air, is extended above the surface of the earth ? Whether it be intercepted in the cavities of the earth, in the substance of water or other liquors, in the pores of animate or inanimate bodies, as plants, woods, stones ; in flesh or fish ? Whether fish breathe ? Whether it be mixed with the blood or humours of the body ? or be the material cause of animal spirits ? Whether the air circumselves or inclose any of the planets, or other great bodies of the world ? as the moon, which many suppose ; or the sun, as KEPLER thinks. What its rarefaction or condensation is ? By what means effected ? What effects it usually does produce, or to the effecting of what it may be made use of ? as for weather-glasses, wind-guns, natural perpetual motions, raising water, making springs, &c.

“ Thirdly, What its qualities or motions are ? What its spring or elater is ? How caused ? Whether from an internal or external efficient ? To what bounds it will extend the parts of the air ? What strength it has in several degrees ? What effects it produceth ? Whether it hath gravity ? What gravity it hath, compared with other bodies ? What is the reason of its gravity ? How its gravity is increased or diminished by rarefaction or condensation ? and by what degrees ? How it comes to rise from the earth ? How it sustains the clouds ? and what peculiar clouds it sustains at several heights ? How it causeth vapours to ascend ? How it keeps two flat bodies together ? raises and sustains water and quicksilver at a determinate height, in the Torricellian experiment, and pumps ? How the gravity of the air keeps some vapours from breaking out of the bodies, in which they are ? What the resistance of the air is to bodies moved through it ? How much it retards the descent of heavy bodies ? How much it stops the motion of a pendulum ? and whether that be the only cause of a pendulum's losing its motion ? How its bears up dust, smoak, &c. How it sustains birds ? The strength requisite to make a wing, or expanded area, sustain a determinate bulk in the air ? And here, what bulk may be raised by what kind of contrivance ? As what by that contrivance, which children use to make their paper kites of ? What means may be thought of for raising a man ; for raising lights to a considerable height ; for conveying intelligence ? What contrivance may be made for letting bodies fall from certain heights, for knowing the swift-

"nefs of their descent? and what other experiments may be tried this way? How
 "it causes heat or cold? And what is the most natural temperature of the air?
 "What is the temperature of the air in several parts of the earth? and in several
 "parts above the superficies of the earth? To what degree it is rarefied upward,
 "and to what degree it is condensed downward, below the surface of the earth,
 "as in deep wells, in mines? or how much it be at the bottom of the sea, &c.
 "Whether it be the medium, that conveys sound? By what means sound is con-
 "veyed, and how fast? Whether a wind will refract a sound? that is, make the
 "sound seem in another place than really it is. How the sound diminishes, ac-
 "cording to several distances from the body, that causes it? How much a fair
 "wind helps the progress of sound, and how much a contrary wind hinders it;
 "and by what means? Whether air conveys light? and if so, How? How it
 "refracts the rays, and by what degrees? What phenomena may be solved by
 "its refraction? Whether it reflect the rays? The causes of its reflective quality?
 "What the degrees of it are, compared with that of other bodies? What phæno-
 "mena of nature will be solved thereby? What its conformability or applicability
 "to other bodies is? that is, To what bodies will it readily unite, and to
 "what not? The reason of that property? The several phenomena solvable
 "thereby? What the use of air is in the of bodies? What the use of it
 "is in respiration, both in men, beasts, birds, insects, fishes, worms, &c? What
 "its external motions are? Whether the wind be not certain currents of the air?
 "What the causes of those currents or winds are? What the whirl-winds or vor-
 "tices are, and their causes? What the ebbings and flowings of the air are, and
 "their causes? What the cause of the breeze, and other constant winds? What
 "the celerities of winds are? that is, how far such and such a wind will pass in a
 "minute? The proportion of its strength to its celerity? How much a ship
 "loses of going as fast as the wind? How much the clouds are moved slower
 "than the ambient air? Whether the air be not moved one way below, and ano-
 "ther above? Whether it be not moved swifter above than below, &c.

"Every of which queries hint, as well as need, abundance of experiments to
 "clear them. And though some few of them will need the diligent observation
 "of some travellers (especially such, as refer to the temperature of the air and
 "winds, in several parts of the earth) and cannot well be answered by any obser-
 "vations or experiments here in England; yet I have inserted them, because, as
 "I think an account of such observations will be very necessary for the making
 "an exact history of the air, so I hope, that this honourable society will not want
 "the will, no more than they do the power, to command such observations to
 "be made for the future."

Mr. Hooke was desired to give in such experiments, as might serve for the
 resolution of these inquiries, and to begin with those, that relate to the first head,
 viz. the constitution and substance of the air.

Dr. Wallis being called upon for his account of the experiment, wherein a
 weight is raised by the blowing of a bladder, promised to bring it in at the next
 meeting.

"He

He mentioned a man born deaf, who came to a beginning of hearing by the shooting off a great piece of ordnance near him.

March 4. The following experiments, concerning the resistance of air to bodies moved through it, was brought in by Mr. Hooke¹.

“ For the finding out the resistance of the air to bodies moved through it, it will be necessary, that

“ Trials should be made with pendulums of all sorts, whose weights should be made with several sorts of materials; as of metals, stones, woods, feathers, wools, &c. and these fashioned into several shapes, as round, elliptical, square, oblong, flat; to be moved flatways, or edgeways, and the like: Then will it be requisite to have one common standard or pendulum, by which the celerity and duration of all the others may be measured.

2. “ Trials should be made with several of these pendulums; first the exhausted receiver, where being a much less quantity of air, it must necessarily less hinder those motions; and next, in the receiver, where the air is well compressed and condensed, and the differences measured, as before, and recorded: then the effects compared with one another, and with those observed in the free air.

3. “ Trials should be made with bodies of several substances; and those of several shapes, which should be let fall from several heights, and the times of their several descents to be measured exactly by a pendulum and recorded.

4. “ Trials should be made by shooting horizontally, from the top of some high tower, or the like, several kinds of bodies; and so the time to be accurately observed, that they remain in the air before they touch the ground.

5. Trials should be made, by shooting bodies perpendicularly upward, and observing accurately both the time of their ascent and descent.

6. “ Trials should be made, by shooting bullets or other bodies horizontally; and so to observe both what time they spend in passing such or such a length; and likewise with what force they hit a mark or body, placed at several distances from the instrument that shoots. These trials likewise should be made with instruments of several strengths.”

Mr. Hooke was appointed curator of these experiments, and to begin with a pendulum sealed up in a glass.

The brewing of beer of barley bread, and of wheaten bread, and of other kinds of grain, as buck-wheat, oats, &c. mixed together, was again recommended to Mr. WINTHROP.

¹ Ibid. p. 193.

Sir WILLIAM PETTY's letter concerning the trimming of the Irish black boat for swiftness was read by Mr. GRAUNT, who was desired to give an extract of it at the next meeting.

Dr. WALLIS brought in his account of the experiment, wherein a weight is raised by the blowing of a bladder; demonstrating it by the principles of statics applied to the particular case; and it was ordered to be registered^{*}.

Mr. AUBREY presented the society with the scheme of a cart, with legs instead of wheels, devised by Mr. FRANCIS POTTER; which was referred to the consideration of Mr. HOOKE, who was ordered to bring in a report of it to the next meeting.

FRANCIS POTTER, B. D. was proposed as a candidate.

Dr. CROUNE made mention of a trial of passing water through the stomach of a man, which succeeded, he said, as well as it had done through a bladder. He was desired to join these two experiments together.

He brought in a paper concerning cider, the reading of which was deferred till the next meeting.

March 11. Mr. WINTHROP presented some bottles of beer brewed of Maiz-bread, which was a pale, well-tasted, middle beer. He was desired to keep some of his liquor for a while, to see how it would bear age. Being asked what proportion of Maiz there had been taken to the eight gallons of beer which was brewed, he said, about half a bushel.

Dr. MERRET moved, that some spirit might be drawn out of this Maiz-beer a fortnight after.

Dr. CROUNE brought in a paper of Mr. NEWBURN's concerning cider; which was read, and ordered to be filed up with the others formerly brought in upon the same subject.

He was reminded, to bring in an account of keeping carps alive for a while out of water, by feeding them in a cellar.

Mr. PELL mentioning a sort of perry ten years old, which he had drank in Tur-gow, boiled till two thirds were wasted, and having a muscadell taste, Dr. MERRET took occasion to say, that he conceived, that with the boiling a good quantity of spirits exhaled. But Dr. GODDARD was of opinion, that any wort, or must, or juice of apples or pears, &c. being boiled before they are fermented, or being put into a still, will only yield phlegm, and very little spirit.

^{*} Original Register, vol. ii. p. 166.

Dr. HOARE moved, that it might be tried, whether juices, before fermentation, lose their spirit.

He mentioned, that the liver of a pigeon had been found full of pease.

Mr. BUCKLAND's paper sent to Mr. OLDENBURG, concerning the way of brewing beer without maling the corn, and of turning rich cider into a kind of canary, was read; whereupon the lord BERKELEY offered the society some beer made of unmalted barley.

Sir NICOLAS CRISPE was propofed as a candidate by Mr. COLWALL.

March 18. Mr. WINTHROP acquainting the society with his intention of returning soon to New England, was desired to take with him a copy of the directions for seamen; and to make as many of the observations and experiments contained therein as he could. The amanuensis was ordered to have the said copy ready for him against the next meeting; and the operator to have a dozen sounding leads, and three our four balls, made against that time; as also the cylindrical vessel with valves, to fetch up water from the bottom of the sea.

Sir ROBERT MORAY moved, that the same directions, together with the same sounding balls, might be recommended to major HOLMES, who was ready to go for the straits.

Mention being made again, that liquors boiled or distilled before fermentation yield no spirits, or very little; it was alledged, that a certain brewer received all the exhalations of the beer and ale, which he brewed, thinking to make a considerable gain of the spirit, which he supposed it would yield; but it proved all phlegm.

Mr. HOOKE suggested, upon this occasion, that urine distilled before it is fermented yields no spirit at all.

Mr. HOOKE's account of the cart with legs, brought in by Mr. AUBREY from Mr. POTTER was read, and ordered, with some alterations, to be sent to the author of this invention.

Mr. HOOKE was also ordered to draw up a full description of this cart, together with a scheme of it, that it might be entered with the animadversions up it.

Mr. OLDENBURG acquainted the society with a letter sent him from Mr. BUCKLAND, a Somersetshire gentleman; wherein was propofed a way of preventing famine, by dispersing potatoes throughout all parts of England. The heads of the letter were read, and a committee appointed to consider of all the particulars thereof, and to make a report to the society. The committee named were, Mr. HOWARD, Mr. BOYLE, Mr. BRERETON, Sir ROBERT MORAY, Dr. WILKINS, Dr. GODDARD, Col. TUKE, Mr. EVELYN, Mr. BALLE, Dr. MERRET, Dr. WHISTLER, Mr. HENSHAW, and Mr. OLDENBURG; who were to meet on the 20th of March, at three in the afternoon, at Mr. HOWARD's lodgings in Arundel-house.

The lord viscount Brouncker, Sir Robert Moray, and Mr. Bruce brought in an account of the observations and experiments, which they had lately made upon the river of Chatham; and his lordship promised to add to them some notes of his own. The paper was ordered to be registered*, and was as follows:

B
 “ There was a glass tube taken A B C, about 25 inches long, and near
 “ $\frac{1}{2}$ of an inch over: this was close sealed up at the one end A, and the
 “ other end B was drawn into a very small pipe C, and bended accord-
 “ ing to the shape in the figure. This pipe weighed 874 grains, and
 “ and being filled with salt-water, and the outlides wiped dry (which was
 “ constantly done in all the subsequent trials) it weighed 2140 grains;
 “ whence deducting the weight of the pipe, 874, we have 1266 grains,
 “ the weight of the water that filled the pipe. This pipe was so fastened
 “ to a line, with a leaden plummet to sink it, that it sunk perpendicu-
 “ larly, with the sealed end of the pipe foremost; by which means the
 “ small hole of the pipe C was opened downwards (that hole being made
 “ purposely small, that the air might not get out whilst the water got in,
 “ nor the water get in when the air forced its way out). Then the glass
 “ was for a short time so held in the water, that all of it, except the
 “ small bended pipe, was covered with the water, which was likewise
 “ observed in every trial (to the end that the air within the pipe might
 “ be well cooled): then let down to the bottom of the water, and there
 “ suffered to stay a little while; afterwards, being drawn up, loosened from
 “ the line, dried, and exactly weighed, it was found to weigh 1833
 “ grains; whence deducting the tube 874, we have 959 grains, the
 “ weight of the water it brought up. Then measuring the depth of the
 “ water by the line by which we had let down the glass, we found it sixteen
 “ fathom and a foot, or ninety-seven foot. This and the following trials were
 “ made the 11th of March 1662, in the channel to the north of Queenborough.

- “ In the following table, A the depth of the water, noted by feet from the mouth
- “ of the pipe to the top of the water.
- “ B the weight of the pipe and water.
- “ C the weight of the pipe.
- “ D the weight of the water.
- “ E the complement of that weight, to the weight of the water that filled the pipe.
- “ F the same with A.
- “ G the height of a pillar of salt-water, which each of the experiments seemed
- “ to infer, that was able to counterbalance the pressure of the atmosphere, or to
- “ condense the included air into $\frac{1}{4}$ its first space; the proportion being as D to E,
- “ so F to G.

* Original Register, vol. ii. p. 208.

| | A | B | C | D | E | F | G |
|------------------|---|----------------|-----------------------|----------------------------------|---|---|---|
| Full. | | 2140—874=1260. | 000::00 | 00 | | | |
| 97 | | 1833—874= 959. | 307::97 | 31 $\frac{1}{2}$ $\frac{1}{2}$ | | | |
| 97 | | 1832—874= 958. | 308::97 | 31 $\frac{1}{2}$ $\frac{1}{2}$ | | | |
| 6 $\frac{1}{2}$ | | 1060—874= 186. | 1080:: | 6 $\frac{1}{2}$ 36 $\frac{1}{2}$ | | | |
| 14 $\frac{1}{2}$ | | 1257—874= 383. | 883::14 $\frac{1}{2}$ | 33 $\frac{1}{2}$ + | | | |
| 31 $\frac{1}{2}$ | | 1500—874= 626. | 640::31 $\frac{1}{2}$ | 31 $\frac{1}{2}$ + | | | |
| 64 $\frac{1}{2}$ | | 1737—874= 863. | 403::64 $\frac{1}{2}$ | 29 $\frac{1}{2}$ + | | | |
| 66 | | 1734—874= 860. | 406::66 | 31 $\frac{1}{2}$ | | | |
| 33 | | 1530—874= 656. | 610::33 | 30 $\frac{1}{2}$ | | | |
| 16 $\frac{1}{2}$ | | 1296—874= 422. | 844::16 $\frac{1}{2}$ | 33 | | | |
| 8 $\frac{1}{2}$ | | 1131—874= 257. | 1009::8 $\frac{1}{2}$ | 33 $\frac{1}{2}$ + | | | |

“ These trials were made the next day with the same glass cylinder.

| | A | B | C | D | E | F | G |
|------------------|---|---------------|-----------------------|--------------------|---|---|---|
| 8 $\frac{1}{2}$ | | 1172—874=298. | 968::8 $\frac{1}{2}$ | 26 $\frac{1}{2}$ + | | | |
| 8 $\frac{1}{2}$ | | 1131—874=257. | 1009::8 $\frac{1}{2}$ | 32 $\frac{1}{2}$ + | | | |
| 16 $\frac{1}{2}$ | | 1300—874=426. | 840::16 $\frac{1}{2}$ | 32 $\frac{1}{2}$ + | | | |
| 33 | | 1510—874=636. | 630::33 | 32 $\frac{1}{2}$ | | | |
| 49 $\frac{1}{2}$ | | 1635—874=761. | 505::49 $\frac{1}{2}$ | 32 $\frac{1}{2}$ | | | |
| 66 | | 1712—883=428. | 428::66 | 33 $\frac{1}{2}$ | | | |

“ These trials did agree by measure with some trials at the same depth, that I made early in the morning.

“ A bundle of corks being knit up in a handkerchief, and fastened to the line at 33 foot from the small end of the glass, the tube was again let down to the same depth, and the corks floating upon the water suspended it at that depth for a good while: afterwards we drew up the cylinder, and measuring it, we found it to agree with the last experiment made at that depth. But we did not weigh it.

“ We repeated the last trial at 66 foot, because that was made, when the water had a pretty strong current, and the string seemed to stream a good way from the perpendicular; to prevent which inconvenience, the boat was suffered to drive with the current, by which means the line seemed to go down perpendicularly into the water; so the cane being pulled up, after it had remained some time at the depth of 66 foot, it weighed 1719—874=845. 421::66. 32 $\frac{1}{2}$ +
 “ let down to 82 $\frac{1}{2}$ foot deep: and suffered to drive as the former, it weighed 1883—874=1009. 257::82 $\frac{1}{2}$. 21 $\frac{1}{2}$ +.

“ Wednesday, March the 11th, in the afternoon, near the same place, where the former trials were made, we tried these following experiments of compression:

Vol. I.

E e

“ Unto



“ Unto the neck or mouth B, of a common quart-bottle A, was fitted a valve C, that opened inward and shut outward. This bottle was let down in the posture you see it, with the mouth foremost; whence the water had, as the bottle was sinking, free passage into it to condense the air. But as soon as the water was got in, the valve shutting, hindered it from getting out, though the bottle were pulled up. The bottle when empty weighed $37\frac{1}{2}$ ounces, and 24 grains; or 18204 grains: filled with salt-water, it weighed $78\frac{1}{2}$ ounces and 3 grains; or 37563 grains: whence taking the weight of the bottle 18204, we have 19359 grains for the weight of the water that filled the bottle.

“ This bottle, let down $13\frac{1}{2}$ fathom by the ship's plumb-line, or 81 foot, the valve was so hard shut, when it was taken up again, that it was difficult to thrust it open: tho' when the mouth CB was set upward, the valve being made of brass without leather, we found it manifestly to leak air, by the hissing noise it made in getting out; and when by a knock the valve was beaten down, the air made a noise in rushing out, like that of a bottle of ale when it flies. The bottle, and the water it brought up, weighed $65\frac{1}{2}$ ounces, or 31656 grains; whence deducting 18204, we have the weight of the water 13452.

“ This bottle was again let down to the depth of 14 fathom, or 84 foot; and being drawn up, was found to weigh, whilst the compressed air remained in it, $65\frac{1}{2}$ ounces and 19 grains, or 31279 grains: when the air was let out, it lost 21 grains of its former weight, counterpoising only 31258 grains; which was supposed to proceed partly from the freezing of the compressed air, and partly from the loss of a little water, that the violent eruption of the air had blown away: from which sum deducting 18204, we have 13054 for the weight of the water.

“ March the 13th another experiment was made, with another bottle of the same kind, which empty weighed $37\frac{1}{2}$ ounces and 12 grains, or 18162 grains: filled with salt water to the valve, it weighed 37353 grains; whence deducting 18162, we have 19191 grains, the weight of the water that filled it. This bottle being let down 8 fathom, or 48 foot, the bottle of compressed air and water together weighed 29142 grains: after the air was let out softly, it was found 24 grains lighter, or 29118; whence deducting the bottle 18162, we have 10956 grains for the water.

“ The bottle with a bended copper-pipe at the top, being let down $8\frac{1}{2}$ fathom, brought up in it $4\frac{1}{2}$ ounces and 24 grains of water. The bottle itself being before counterpoised; the same kept a longer time at the same depth. brought up $8\frac{1}{2}$ ounces 25 grains of water; the same kept yet longer a great deal, brought up $9\frac{1}{2}$ ounces and 6 grains: the water that filled the bottle weighed $41\frac{1}{2}$ ounces and 24 grains; which different proportions of water taken in, we judged to proceed either from the leaking of the vessel at the screw, by which means the water had a passage into the bottle, below the mouth of the bended pipe, which would therefore serve for a vent-hole for the air to get out at; or else, that the motion of

“ the top of the water being a little uneven, first the pressure upon the bottle,
 “ though fixed in the same place, must consequently alter; next the bottle itself
 “ was by the cockling of the boat sometimes lifted higher, and then let lower:
 “ both which irregularities must necessarily alter the height of the pressing pillar;
 “ whence, as the pressure was increased, the water got in; and, as it decreased, the
 “ air got out. And without doubt many such changes would in time quite fill
 “ the bottle.

“ *Experiments of the weight of water.*



“ A white glass vial, much in the shape described in the
 “ figure, with a small short neck, weighed, when empty,
 “ 1425 grains; filled exactly full with salt-water, it weighed
 “ 5247 grains: whence 1425 being deducted, we have 3822
 “ grains, the weight of the water. The same filled with
 “ fresh water taken out of the Thames at Greenwich, near
 “ low water, weighed 5164 grains; whence deducting 1425
 “ grains, we have 3739, the weight of the fresh. And
 “ weighing afterward the water wherewith the strong ale at
 “ Margate is brewed, we found it exactly the same with this
 “ Greenwich water. Whence we conclude the proportion
 “ of these fresh waters to this salt, to be as 3739 to 3822;

“ that is, near as 45 to 46.

“ *Experiments of the heat and cold of the water.*



“ A sealed-up thermometer, much of the shape of that in the
 “ figure, was let down to the bottom of the water, at the depth of
 “ sixteen fathom and a foot, and there suffered to stay a good
 “ while, that the coldness of the water might condense the included
 “ liquor so far, as to suffer the air to get into the bigger ball,
 “ which was therefore placed uppermost. But though the ther-
 “ mometer was suffered to lie a good while at that depth, and
 “ then suddenly pulled up, we could not find, that it had any whit
 “ more condensed the liquor, than the same would be by being
 “ kept a good while under the surface of the water at the top,
 “ Whence we judged the temperature of the water, both at the
 “ top, in the middle (for by other trials we found the same at
 “ other depths) and at the bottom, to be the same.

“ *Observations of sound.*

“ Being at a place of the Thames, about four miles above
 “ Gravesend, there happened to be shot off several pieces of ord-
 “ nance, by a ship half a mile further up the river; the multi-
 “ tudes of echos from each of which made a noise much resem-
 “ bling thunder; which, could they have been numbred, would
 “ have amounted to several scores, if not hundreds. And diligently
 “ observing since the noise of thunder, it seemed to me to be partly
 “ made by echos from the clouds: which would seem more plau-

"sible, if by any means we could certainly find the clouds to echo a sound. A gun being afterward shot off by the vessel we were in, when we were near the mouth of the Thames, and several ships being on this and that side of us, we could sensibly hear several echos rebounded from them."

Mr. AUBREY mentioned, that he had been informed, that the duke of ORLEANS had a way of producing animals by the putrefaction of vegetables. Sir ROBERT MORAY promised to ask Dr. MORISON¹ concerning it.

This gave occasion to discourse again of equivocal generation, and to desire those members, who were, on the 22d of October, 1662, charged with making experiments concerning the same, to discharge their undertaking: and to them were added Dr. GODDARD, Dr. WHISTLER, and Mr. EVELYN, the last of whom undertook particularly to put several pieces of flesh and some blood in a closed vessel, which might not be fly-blown, to see what it would produce. Dr. GODDARD likewise engaged to try what would be produced by sack poured upon good cheese.

Sir NICHOLAS CRISPE and Mr. FRANCIS POTTER were elected.

It was resolved, that Mr. EVELYN's treatise concerning timber-trees and fruit-trees be printed by order of the Royal Society, upon perusal of it by Dr. WILKINS, Dr. GODDARD, and Dr. MERRET, who were desired to peruse it accordingly.

1663. *March 25.* The experiment of purging water from air not succeeding, the engine not being tight, it was ordered to be tried again at the next meeting; and likewise the experiment to be made again, how long a fish will live in water thus freed from air; and the celerity of a falling body in a long glass, exhausted of air. Mr. HOOKE was appointed curator of these three experiments.

The lord viscount Brouncker promised to bring in at the next meeting his notes of the observations lately made by him and Sir ROBERT MORAY at sea.

Dr. CROUNE shewed an egg-shell put into Champagne wine, and covered with a kind of tartarous substance. He was desired to bring the account of it in writing, as also that of the carp fed out of water.

Mr. WINTHROP received a copy of the directions for steamen; and the operator was ordered to make ready for him, as soon as he could, those wooden balls and leads, for which he had orders before.

The amanuensis was ordered to make another copy of the same directions for major HOLMES.

Sir ROBERT MORAY, Dr. WILKINS, and Mr. HOOKE were desired to be curators of trying the two sorts of cylindrical vessels for the fetching up of water from the bottom of the sea.

¹ ROBERT MORISON, M. D. author of the *Histeria Plantarum*. He had been physician to the duke of ORLEANS. WOOD'S Falsi, Oxon. vol. ii. col. 178.

The

The committee appointed to consider of Mr. BUCKLAND's letter made a report, *viz.* that the said letter was read before them, containing a proposition to plant potatoes through all the parts of England, together with the way of ordering them, and the benefit thereof in time of scarcity of food : And that hereupon several members of the committee had confirmed the substance and particulars of the said letter, concerning the soil fit for them, their diffusiveness, their usefulness for meat and bread, their prospering as well in ploughed as in delved land ; the easiness of defending them from frost by any refuse &c. And that therefore the committee had approved of the said proposition with this result: 1. That all those members of the society, who had land, should be desired to begin the planting of this root, and to persuade their friends to do the same. 2. That in order thereunto Mr. BUCKLAND should be desired, if he had any quantity to spare, to send up some, to furnish those, who had conveniency to plant them ; Mr. HOWARD and Mr. BOYLE offering themselves to procure as many of them, as they could for that purpose. 3. That Mr. BOYLE should be desired to communicate to the society those observations and notes, which he had made upon this root, the manner of planting it, and the diffusiveness of the seminal virtue thereof. 4. That Mr. EVELYN should be desired to join this proposition by way of appendix to his discourse of timber-trees.

This report being made, the society approved of all the particulars of the result of this committee, and accordingly recommended this work to their members, ordering withal, that thanks should be returned to the author of this proposition for his respect to the society, and care of the public good.

Dr WILKINS gave an account of the way and benefit of setting corn by a peculiar engine, and was desired to send for it from Oxford, and to communicate to the society in writing the substance of what he had related to them this day concerning this matter.

Sir ROBERT MORAY mentioned, that he had asked Dr. MORISON concerning the production of animals by the putrefaction of vegetables, said to have been done by the duke of ORLEANS ; but the doctor knew of no such thing.

Mr. EVELYN was put in mind of the experiment committed to him of closing up blood and pieces of flesh, to see whether it would produce any insects.

Sir ROBERT MORAY, Col. TUKE, and Dr. WILKINS were appointed curators of the experiment of producing maggots by cheese and sack.

Dr. CROUNZ suggested, that the viper powder, formerly committed to the care of Mr. PULLEYN, might be looked after ; and that Mr. PULLEYN should be desired to observe the proper time, wherein it was thought that vipers would be produced out of that powder.

Mr. HOOKE was solicited to prosecute his microscopical observations, in order to publish them.

Si:

Sir ROBERT MORAY brought in a poisoned dagger presented to his majesty from an Indian king by the captain of the ship *Truro*, lately returned from the East-Indies. The dagger was warmed, and with it blood was drawn from a kitten, to see whether it would be killed thereby. The kitten not dying whilst the society was together, the operator was appointed to observe what should become of it. The dagger was committed to the care of Dr. GODDARD.

It being mentioned, that a certain spirit extracted out of tobacco was by some conceived to be a subtle poison, it was debated, whether some ways of extracting such a spirit should be tried; and it was thought fit to defer it till the society heard from Sir JOHN FINCH*, to whom the care of this matter was recommended.

A fish was put in a glass with water, closed up with lime, in order to see how long it would live so, the air being excluded from it.

Sir ROBERT MORAY mentioned, that Monsieur LE FEBVRE had made the experiment formerly committed to him, of holding salt of tartar both in hot water, and in the steam of hot water. Sir ROBERT was desired to speak to the curator of this experiment, to bring it in writing to the next meeting.

Sir ROBERT MORAY having acquainted the company, that Sir HENRY BENNET, secretary of state, had procured his majesty's hand to the patent*, it was ordered, that the lord viscount Brouncker, Sir PAUL NEILE, and Mr. AERSKINE should give Sir HENRY the thanks of the society for this favour and care.

JAMES LONG, esq; was proposed as a candidate by Col. Tuke.

April 1. An account was given of the construction of the pneumatical engine, as it then was; which was ordered to be brought in writing, together with a scheme of the engine, by Mr. HOOKE.

Water was purged from air by the said engine, and Mr. HOOKE was appointed to make the experiment of Monsieur HUYGENS of the not subsiding of such water, according to the Torricellian experiment, against the next meeting.

The experiment of the exhausting the air from a fish in water was tried in the engine; whereby the fish, which was a tench, was put into much disorder, and buoyed up to the upper part of the water, when he would sink; his eyes also swelling and standing out. The operator was ordered to observe the fish, and how long he would live after the exhausting of the air; the experiment being directed to be tried again at the next meeting, together with that of the celerity of falling bodies in a glass exhausted of air.

* He was a fellow of the society, and had been knighted by the king on the 10th of January, 1662. Dr. WARD'S Lives of the professors of
Gresham College, p. 228.

* The second charter granted to the Royal Society, which passed the privy seal April 22, 1663.

An account was given of the tench shut up close with lime in a glass with water, viz. that it had been taken out the next morning, after fourteen or fifteen hours, and found alive. Dr. GODDARD was desired to repeat the experiment, and to fill the glass full of water, and to leave the fish in it a longer time, &c.

Major HOLMES received a copy of the directions for seamen by the hands of the operator; and Mr. HOOKE was appointed to wait on the said major, and to direct him in the use of the balls and leads for sounding without a line, and of the cylindrical vessel for fetching up of water from the bottom of the sea.

Mr. HOOKE was charged to bring in at every meeting one microscopical observation at least.

The kitten wounded at the last meeting with the poisoned dagger, sent from the East Indies, was produced alive.

It was ordered, that Monsieur LE FEBURE should be desired by Sir ROBERT MORAY to give an account of the salt of tartar, held both in warm water, and in the steam thereof.

The lord viscount Brouncker related a story of a lady recovered from a consumption by drinking ale or beer brewed of water, that ran over a slate-pit; which occasioned some discourse concerning the virtue, which might be communicated by slate, as is done by bole or chalk.

His lordship likewise mentioned a way used by Mr. LE FEBURE of making a powder of sponges, imbibed with a water distilled from the same, very good to cure the struma, and supposed to be performed by the volatile spirit contained in that powder. Of the former Sir ROBERT MORAY could give a fuller account, and of the latter Mr. LE FEBURE.

There was read a letter sent from a French gentleman, Monsieur DE LA QUINTINYE, to Mr. OLDENBURG, dated at Paris March 2, 1667, N. S.* concerning the cutting and whole method of ordering melons, after they are come up. The writer of this letter, at the close of it, offering likewise his service to the society, it was ordered, that thanks should be returned to him for his civilities.

The society being made acquainted also with this gentleman's extraordinary skill in the cutting and the whole method of the culture of fruit trees, and with his having written something upon that subject; it was farther ordered, that he should be desired, in the name of the society, to communicate to them his observations, which they would have annexed to Mr. EVELYN's discourse of timber trees ready to be published, owning Monsieur DE LA QUINTINYE to be the author of those observations.

* Letter-book, vol. i. p. 79.

Mr.

Mr. Hooke's paper concerning the Chinese cart with one wheel, mentioned by MARTINIUS in his *Atlas Sinenfis*, was read, and discoursed upon, that the said cart was like a wheel-barrow: and the paper was ordered to be filed up.

Dr. WILKINS made mention of a certain instrument like an umbrella, to be used instead of an anchor in fathomless sea, and to stay a ship in a storm, or upon other occasions.

Mr. LONG was elected.

THOMAS SPRAT, M. A. was proposed as a candidate by Dr. WILKINS, and EDWARD COTTON, D.D. by Mr. BALLE.

April 8. The operator gave an account of a tench tried in the pneumatic engine; that after an hour and an half he opened the glass, whereupon the fish sunk to the bottom immediately, and being taken out was found dead; and upon being opened, its bladder was discovered to be burst. He was directed to give an account of this in writing.

The like experiment was tried upon two young eels, but they seemed not sensible of the exsuction of the air. Order was given for trying these two experiments again at the next meeting.

Mr. Hooke shewed the company a scheme of the appearance of common moss in a microscope. He was desired to continue, and against next meeting to have ready, the microscopical appearance of the little fishes in vinegar.

Mr. BOYLE brought in a written account of potatoes from his gardiner, which was ordered to be entered, and is as follows:

“SIR,

“I have, according to your desire, sent a box of potatoes. My care hath been
 “to make choice of such, that are fit to set without cutting; for many, that have
 “not small ones enough, are constrained to cut the great ones: but I do not
 “approve of that husbandry, neither do I make use of it, because, when they are
 “cut, the worms do feed on them; and so devouring the substance, the branch
 “groweth the weaker, and the root small. The ground, which they thrive best
 “in, is a light sandy earth, where fern or briars do naturally grow. Their nature
 “is not to grow fruitful in a rich soil, because they will spring forth many
 “branches, and so incumber the ground, that they will have but small roots.
 “You may cause them to be set a foot apart, or something better, whole as they
 “are, and there will be a great increase, and the branch will bring forth fruit,
 “which we call the potatoe-apple. They are very good to pickle for winter fallads,
 “and also to preserve. I have tasted of many sorts of fruit, and have not
 “eaten the like of that: they are to be gathered in September, before the frost
 “doth take them. If you are minded to have great store of small roots, which

⁷ Letter-book, vol. i. p. 83.

“are

"are fittest to fet, you may cause them to lay down the branches in the month before named, and cover them with earth three or four inches thick; and the branch of every joint will bring forth small roots in so great a number, that the increase of one yard of ground will fet twenty the next season: And it must be the care of the gardiner to cover the ground where the roots are with fern or straw, half a foot thick, or better, at the beginning of the winter, otherwise the frost will destroy the roots; and as they have occasion to dig out the great roots, they may uncover the ground, and leave the small ones in the earth, and cover them as before, to preserve feed. Now the season for digging the ground is in April or May, but I hold it best the latter end of April; and when they dig the ground, let them pick out as many as they can find, small and great, and yet there will be enough for the next crop left. Let the covering, which they are covered withal, be buried in the ground; and that is all the improvement that I do bestow. I could speak in the praise of the root, what a good and profitable thing it is, and might be to a commonwealth, could it generally be experienced, as the inhabitants of your town can manifest the truth of it; but I will be silent in speaking in the praise of them, knowing you are not ignorant of it."

Mr. PALMER presented the society with some oil-seeds, esteemed to be the *sesamum*, brought out of Syria, yielding very good oil. Mr. HOWARD and Mr. EVELYN took some of these seeds with them, promising to sow them.

Mr. EVELYN mentioned, that he closed up some pieces of flesh, and some blood, &c. and exposed them, in order to see what insects would be produced from thence.

Dr. MERRET promised to bring in, a fortnight hence, his experiments of freezing.

Monf. LE FEBURE brought in two vials, both containing some salt of tartar, and hermetically sealed up; whereof one had been put and kept awhile in warm water, but suffered no visible alteration, nor stuck to the sides of the glass; whereas the other, that was only held in the steam of the warm water, without immersing it therein, had the salt sticking to its sides, the subtil aqueous vapours seeming to have been able to penetrate where the water itself could not. He was desired to repeat the experiment, wherein the salt adhered to the sides of the glass.

He communicated likewise a certain volatile spirit, which he said he had drawn from sponges, having the scent and taste of hartshorn spirit; and that it was an excellent remedy for all strumous swellings.

The story of a cure done upon a lady in a consumption by a mineral slate-water being repeated by Sir ROBERT MORAY, Monf. LE FEBURE asserted, that slate had a vitriol and sulphur in it, which, by infusion, communicated its virtue; and

Vol. I.

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he promised to produce some of it before the society, and to give in writing the process of drawing such vitriol and sulphur out of the slate.

MONS. LE FEBURE gave likewise an account of a mixture of salt of tartar and alum, yielding a strange stinking spirit, and incrusting the recipient with a black substance. He was desired to bring his discourse thereof in writing.

MR. HOOKE was ordered to prepare, for the next meeting, the two experiments of water purged from air; and of the descent of bodies in an exhausted receiver.

April 15. MR. LONG and DR. COTTON were admitted into the society.

ANTHONY LOWTHER, esq; was proposed as a candidate by DR. WILKINS.

MR. SPRAT was elected.

The operator was directed to have ready, against the next meeting, several sorts of fishes, to be tried again in the pneumatical engine: And

To put up some fry of fish in a glass with water luted up, and to see how they would thrive there.

It was mentioned by him, that clay put into the water, after the pumping out of the air, revived the carp therein.

MR. PELL remarked, that lampreys transported out of England into Holland, and not stirred continually, die, and so shine not, for the catching of cod-fish.

MR. HOOKE shewed two microscopical schemes, one representing the pores of cork, cut both transverse and perpendicular; the other a Kettinger-stone, appearing to be composed of globules, and these hollow ones, each having three coats sticking to one another, and so making up one intire firm stone.

He was desired to examine the barks of other trees, and to write down all that he should observe about these and the like appearances; and also to bring in to the next meeting the representation of the little fishes swimming in vinegar.

DR. WREN was desired to communicate what he concluded from the earl of SANDWICH's observations: And

To give order to the operator for the making of the engine for the setting of corn, and to describe what the advantages of it are, or have been found to be by former experiments.

MR. HOOKE was appointed to continue the observations of the satellites of Jupiter, as he had opportunities; and DR. PORE was desired to request of the bishop
of

of EXETER* the communication of those papers of Mr. ROOKE, in which the observations of the same kind are stated.

Dr. GODDARD produced a letter sent to him from a domestic of Mr. BUCKLAND, together with some potatoes, to be distributed amongst the members of the society or their friends, such as had conveniency of planting them.

Sir ROBERT MORAY communicated an account in Latin, of the dissection made of the body of the lord BELCARRES, in whose heart was found two stones. The paper was ordered to be registered¹.

Occasion being given to discourse of the star discovered by Dr. PALMER, archdeacon of Northampton, Sir ROBERT MORAY moved, that a survey might be made of the stars of the Zodiac by the best telescopes, for the discovery of new stars, and for rectifying the places of stars already known: for which purpose, Sir ROBERT offered himself to take his share; Mr. BALLE undertook the survey of a whole sign; and Mr. HOOKE of as much as he could.

Mr. BOYLE confirmed what was said at the preceding meeting, about the volatile spirit extracted out of a sponge, to be like the spirits drawn out of animal substances. And it being demanded, what difference he observed between animal and vegetable spirits, he said that he had found, that the volatile spirits of animals poured upon acid spirits caused an effervescence, but those of vegetables did not.

He offered, in case he could get any sensitive plants, to try how their spirits differed from those of ordinary plants: and to make the like trial with mushrooms.

Mr. HOOKE was ordered not to fail of bringing in, at the next meeting, a list of experiments to be made in the new engine for the condensation of the air.

April 22. Dr. GODDARD was desired to keep some of the vinegar with the little fishes in it well stopped, and some unstopped, to see whether they would live in the one, and die in the other.

Mr. HOOKE brought in two microscopical observations, one of leeches in vinegar; the other of a bluish mould upon a mouldy piece of leather.

Mr. BOYLE shewed a box, with figures carved on it very deep, done by an art of softening wood, which the artist could harden again. He was desired by the society to let the artist know, how well they were pleased with this skill of his, and that they were willing to assist him in procuring a patent for him, in order that he might enjoy the benefit of his art, upon condition that he should acquaint them with the secret.

* Dr. SETH WARD.

¹ Original Register, vol. ii. p. 217. This pa-

per is published in English, in the Philosophical Transactions, n^o 5 p. 86, 87. July, 1665.

Dr. WREN was desired to direct the operator for the making of the engine to set corn.

Mr. LONG proposed, that fishes of several kinds and several ages might be put into the pneumatical engine, to see which of them would die soonest; he being persuaded, that the youngest would die soonest, and that roach, dace, and carp, would die sooner than tench, eels, &c. The operator was ordered to provide several sorts of fishes, and a more capacious glass, against the next meeting.

Sir ROBERT MORAY desiring, that it might be considered, which way was best to transport fish from one country to another; whether by the spawn, or by young fry, or by old fish? Mr. LONG said, that as to the spawn, he could give no account thereof; and as to the fry, he was of opinion, that the younger the fish was, the sooner it would die, and the less it would be able to endure any hardship; but the older they were, the longer they would live, and the more hardship they would bear.

Sir ROBERT MORAY mentioning, that fish being transported in vessels from one place to another would hurt their noses against the vessel, and die soon after, Dr. WREN related, that a fish (of which Dr. WILKINS had the picture) had been taken alive, a part of the head and nose of which was bitten off, and one eye wanting.

The observations made by Mr. ROOKE of the satellites of Jupiter were said to be delivered by the bishop of EXETER to Dr. POPE, who was desired, with Mr. HOOKE, to continue them as they should have opportunity.

Mr. LONG acquainted the society, that there were ermines in England, and that he would produce some before them. He mentioned also, that bay-salt being chrown upon toads would kill them. He was desired to make the experiment with common salt, or any vegetable or mineral salt.

He made mention likewise of a kind of stones with natural screws, and promised to shew some of them.

The lord viscount BOUNCKER, Sir ROBERT MORAY, Mr. BALLE, Dr. WREN, Dr. POPE, Dr. CROUNE, and Mr. HOOKE, were desired to name, at the next meeting, some sign, or part of a sign, of the zodiac, which they would undertake to survey.

The experiment of the not subsiding of water purged from air was ordered to be made at the next meeting: as also that of making the air extracted out of water return to water.

It was ordered, that Mr. BOYLE should be desired to try, whether highly rectified spirit of wine, and camphire dissolved therein, would burn away together, when lighted.

Mr.

Mr. LOWTHER was elected.

Dr. CROUNE brought an account in writing of three experiments formerly recommended to him: 1. Of an egg put into wine, and incruſted with tartar. 2. Of wine tranſfuding through a ſtomach. 3. Of a carp fed in the air: the reading of which was deferred till the next meeting.

This day the ſecond charter, granted by the king to the Royal Society, paſſed the great ſeal in the following terms:

“ CAROLUS ſecundus, Dei gratia Angliæ, Scotiæ, Franciæ, & Hiberniæ, rex, fidei defenſor, &c. omnibus, ad quos hæ literæ noſtræ parentes pervenerint, ſalutem. Diu multumque apud nos ſtatuiſmus, ut imperii fines, ſic etiam artes atque ſcientias ipſas promovere. Favemus itaque omnibus diſciplinis, particulari autem gratia indulgemus philoſophicis ſtudiis, præſertim iis, quæ ſolidis experimentis conantur aut novam extundere philoſophiam, aut expolire veterem. Ut igitur inclareſcant apud noſtros huiusmodi ſtudia, quæ nuſquam terrarum adhuc ſatis emicuerunt; utque nos tandem univerſus literarum orbis non ſolum fidei defenſorem, ſed etiam veritatis omnimodæ & cultorem ubique & patronum ſemper agnoſcat: Sciatis, quod nos de gratia noſtra ſpeciali ac ex certa ſcientia & mero motu noſtris ordinaviſmus conſtituimus & conceſſimus, ac per præſentes pro nobis heredibus & ſucceſſoribus noſtris ordinamus conſtituimus & concedimus, quod de cætero in perpetuum erit ſocietatis de præſide concilio & ſodalibus conſiſtens, qui vocabuntur & nuncupabuntur *Præſes Concilium & Sodales Regaliſ Societatis Londini pro ſcientia naturali promovenda* (cujus quidem ſocietatis nos ipſos fundatorem & patronum per præſentes declaramus) & eandem ſocietatem, per nomen Præſidis Concilii & Sodalium Regaliſ Societatis Londini pro ſcientia naturali promovenda, unum corpus corporatum & politicum in re factæ & nomine realiter & ad plenum pro nobis heredibus & ſucceſſoribus noſtris facimus ordinamus creamus & conſtituimus per præſentes, & quod per idem nomen habeant ſucceſſionem perpetuam: Et quod ipſi & eorum ſucceſſores (quorum ſtudia ad rerum naturalium artiumque utilium ſcientias experimentorum fide ulterius promovendas in Dei Creatoris gloriam, & generis humani commodum applicanda ſunt) per idem nomen *Præſidis Concilii & Sodalium Regaliſ Societatis Londini pro ſcientia naturali promovenda*, ſint & erunt perpetuiſ ſuturis temporibus perſonæ habiles & in lege capaces ad habendum perquirendum percipiendum & poſſidendum terras tenementa prata paſcua paſturas libertates privilegia franchiſias juſridiſciones & hereditamenta quæcunque ſibi & ſucceſſoribus ſuis in feodo & perpetuitate, vel pro termino vitæ vitarum vel annorum, ſeu aliter quocunque modo, ac etiam bona & catalla ac omnes alias res cuſcuſcunque fuerint generis naturæ ſpeciei ſive qualitatis (ſtatuto *De alienatione in manum mortuam* non obſtante) necnon ad dandum concedendum & aſſignandum eadem terras tenementa & hereditamenta bona & catalla, & omnia facta et res neceſſarias faciendum & exequendum de & concernentia eadem, per nomen prædictum: Et quod per nomen *Præſidis Concilii & Sodalium Regaliſ Societatis Londini pro ſcientia naturali promovenda* prædictum placitare & implorari, reſpondere & reſponderi, defendere & defendi, de cætero in perpetuum valeant & poſſint, in

" quibuscunque curiis placeis & locis, & coram quibuscunque iudicibus & iusticiariis & aliis personis & officariis nostris heredum & successorum nostrorum, in omnibus & singulis actionibus, tum realibus tum personalibus, placitis sēctis querelis causis materiis rebus & demandis quibuscunque, cuiuscunque sint aut erunt generis naturæ vel speciei, eisdem modo & forma, prout aliqui ligei nostri intra hoc regnum nostrum Angliæ, personæ habiles & in lege capaces, aut ut aliquod corpus incorporatum vel politicum intra hoc regnum nostrum Angliæ, habere perquirere recipere possidere dare & concedere, placitare & implacitari, respondere & responderi, defendere & defendi, valeant & possint, valeat & possit : Et quod iidem præses consilium & sodales Regalis Societatis prædictæ & successores sui habeant in perpetuum commune sigillum, pro causis & negotiis suis & successorum suorum quibuscunque agendis deservitutum ; & quod bene liceat & licebit eisdem præsidi concilio & sodalibus Regalis Societatis prædictæ, & successoribus suis pro tempore existentibus, sigillum illud de tempore in tempus frangere mutare & de novo facere, prout eis melius fore videbitur experiri.

" Damus insuper & concedimus per præsentis præsidi concilio & sodalibus Regalis Societatis prædictæ eorumque in perpetuum successoribus, in favoris nostri regii erga ipsos nostræque de ipsis peculiaris existimationis præsentis & futuris ætatibus testimonium, hæc honoris insignia sequentia, viz. In parmæ argentæ angulo dextro tres leones nostros Anglicos ; & pro crista galeam corona stoliculis interstincta adornatam, cui supereminet aquila nativi coloris, altero pede scutum leonibus nostris insignitum tenens ; telamones scutarios, duos canes fagaces albos, colla coronis cinctos (prout in margine luculentius videre est) a prædictis præside concilio & sodalibus ipsorumque successoribus, prout seret occasio, in perpetuum gestanda producenda possidenda. Et, quod intentio nostra regia meliorem sortiatur effectum, ac pro bono regimine & gubernatione prædictæ Regalis Societatis de tempore in tempus, volumus, ac per præsentis pro nobis heredibus & successoribus nostris concedimus eisdem præsidi concilio concilio & sodalibus Societatis Regalis prædictæ & successoribus suis, quod de cætero in perpetuum concilium prædictum erit & consisset ex viginti & una personis (quorum præsidem pro tempore existentem, vel ejus deputatum, semper unum esse volumus) & quod omnes & singulæ aliæ personæ, quæ intra duos menses proxime sequentes post datum præsentium per præsidem & concilium, vel per aliquos undecem vel plures eorum (quorum præsidem pro tempore existentem, vel ejus deputatum, semper unum esse volumus) vel per duas tertias partes vel plures prædictorum undecim vel plurium ; & in omni tempore sequenti per præsidem concilium & sodales, sive per aliquos viginti & unum vel plures eorum (quorum præsidem pro tempore existentem, vel ejus deputatum, semper unum esse volumus) sive per duas tertias partes vel plures prædictorum viginti & unius vel plurium ; in eandem societatem accipiantur & admittentur ut membra Regalis Societatis prædictæ, & in registro per ipsos conservando annotatæ fuerint erunt vocabuntur & nuncupabuntur sodales Regalis Societatis prædictæ, quamdiu vixerint, nisi ob causam aliquam rationabilem, secundum statuta Regalis Societatis prædictæ condenda, quemvis eorum amoveri contigerit : quos quanto eminentius omnis generis doctrinæ bonarumque literarum studio clarescant, quanto ardentius huius societatis honorem studia & emolumentum promoveri cupiant, quanto vitæ

" inte-

“ integritatē morumque probitate ac pietate emineant, & fidelitate animique erga
 “ nos coronam & dignitatem nostram sincero affectu polleant; eo magis idoneos &
 “ dignos, qui in sodalium ejusdem societatis numerum adificiantur, omnino cen-
 “ feri volumus. Et, pro meliori executione voluntatis & concessionis nostræ in
 “ hac parte, assignavimus nominavimus constituimus & fecimus, ac per præsentēs
 “ pro nobis heredibus & successoribus nostris assignamus nominamus constituimus
 “ & facimus, prædictum & fidelem nobis WILLIELMUM vicecomitem BROUN-
 “ KER, cancellarium præcharissimæ consortis nostræ reginæ CATHARINÆ, esse
 “ primum & modernum præsidem Regalis Societatis prædictæ; volentes quod
 “ prædictus WILLIELMUS vicecomes BROUNCKER in officio præsidis Regalis So-
 “ cietatis prædictæ a datu præsentium usque ad festum Sancti ANDRÆ proximum
 “ sequentem⁴ post datum præsentium continuabit, & quousque unus alius de con-
 “ cilio Regalis Societatis prædictæ pro tempore existente ad officium illud debito
 “ modo electus præfectus & juratus fuerit, juxta ordinationem & provisionem in
 “ his præsentibus inferius expressam & declaratam (si prædictus WILLIELMUS
 “ vicecomes BROUNCKER tam diu vixerit) sacramento corporali in omnibus & per
 “ omnia officium illud tangentia bene & fideliter exequendum, secundum veram
 “ intentionem harum præsentium, coram prædicto & perquam fideli consanguineo
 “ & consiliario nostro EDUARDO comite CLARENDON cancellario nostro præ-
 “ dicto sacramentum prædictum administrare plenam potestatem & auctoritatem
 “ damus & concedimus, in hæc verba sequentia, viz. *I WILLIAM vicecounts BROUN-
 “ KER do promise to deal faithfully and honestly in all things belonging to the trust
 “ committed to me, as president of the Royal Society of London for improving natural
 “ knowledge, during my employment in that capacity. So help me God.* Assignavimus
 “ etiam constituimus & fecimus, ac per præsentēs pro nobis heredibus & successo-
 “ ribus nostris fideles nobis & fideles ROBERTUM MORAY militem unum
 “ a secretoribus nostris conciliis in regno nostro Scotia, ROBERTUM BOYLE armi-
 “ gelum, WILLIELMUM BRERETON armigerum filium primogenitum baronis de
 “ BRERETON, KENELMUM DIGBY militem præcharissimæ matri nostræ MARIÆ
 “ reginæ cancellarium, GILBERTUM TALBOT militem jocalium nostrorum thesau-
 “ rarium, PAULUM NEILE militem unum ostiarii cameræ privatæ nostræ,
 “ HENRICUM SLINGSBY armigerum unum generosorum prædictæ privatæ cameræ
 “ nostræ, WILLIELMUM PETTY militem, TIMOTHEUM CLARKE in medicinis docto-
 “ rem & unum medicorum nostrorum, JOHANNEM WILKINS in theologia docto-
 “ rem, GEORGIUM ENT in medicinis doctorem, WILLIELMUM AERSKINE unum
 “ a poculis nostris, JONATHAN GODDARD in medicinis doctorem & professorem
 “ Collegii de Gresham, WILLIELMUM BALLE armigerum, MATTHEUM WREN
 “ armigerum, JOHANNEM EVELYN armigerum, THOMAM HENSHAW armigerum,
 “ DUDLEY PALMER de Grey's-Inn in comitatu nostro Middlesexiæ armigerum,
 “ ABRAHAMUM HILL de London armigerum, & HENRICUM OLDENBURG armi-
 “ gerum, una cum præside prædicto, fore & esse primos & modernos viginti &
 “ unum de concilio & sodalibus Regalis Societatis prædictæ, continuandos in
 “ officiis concilii prædicti a datu præsentium usque ad prædictum festum sancti
 “ ANDRÆ apostoli proximum sequentem, & deinde quousque alia idoneæ per-
 “ sonæ & habiles & sufficientes in officia prædicta electæ præfectæ et juratæ fuerint

⁴ Sic in Authent. & aliquoties infra.

“ (si tam diu vixerint, aut pro aliqua iusta & rationabili causa non amote^a fuerint)
 “ sacramentis corporalibus coram præfide pro tempore exillente prædictæ Regalis
 “ Societatis ad officia sua bene & fideliter in omnibus & per omnia officia illa tan-
 “ gentia exequendum prius præstandis, secundum formam & effectum prædicti fa-
 “ cramenti, mutatis mutandis, præfidi Regalis Societatis prædictæ per cancella-
 “ rium nostrum Angliæ administrandi (cui quidem præfidi pro tempore exillenti
 “ sacramenta prædicta administrare personis prædictis, & aliis quibuscunque in po-
 “ sterum de tempore in tempus in concilium prædictum eligendis, plenam potesta-
 “ tem & auctoritatem pro nobis heredibus & successoribus nostris damus & con-
 “ cedimus per præfentes) & quod eadem personæ sic, ut præfertur, ad concilium
 “ prædictæ Regalis Societatis electæ præfectæ & juratæ, & in posterum eligendæ
 “ præficiendæ & jurandæ de tempore in tempus, erunt & existant auxiliantes con-
 “ sistentes & assistentes in omnibus materiis rebus & negotiis, meliores^a regulati-
 “ onem gubernationem & directionem prædictæ Regalis Societatis, & cujuscunque
 “ membri ejusdem, tangentibus seu concernentibus. Concedimus etiam præfidi
 “ concilio & sodalibus Societatis prædictæ & eorum in perpetuum successoribus,
 “ quod ipsi & successores eorum, seu aliqui novem vel plures eorum (quorum præ-
 “ fidem pro tempore existentem, vel ejus deputatum, semper unum esse volumus)
 “ conventus seu congregationes de seipsis pro experimentorum & rerum natura-
 “ lium cognitione & indagine aliisque negotiis ad Societatem prædictam spectan-
 “ tibus, quoties & quando opus fuerit, licite facere & habere possint in collegio
 “ sive aula sive alio loco commodo intra civitatem nostram Londini, vel in aliquo
 “ alio loco commodo intra decem milliaria ab eadem civitate nostra. Et ulterius
 “ volumus, ac per præfentes pro nobis heredibus & successoribus nostris concedi-
 “ mus præfatis præfidi concilio & sodalibus Regalis Societatis prædictæ & suc-
 “ cessoribus suis, quod præses concilium & sodales Regalis Societatis prædictæ pro
 “ tempore existentes, sive aliqui triginta & unus vel plures eorum (quorum præ-
 “ fidem pro tempore existentem, vel ejus deputatum, unum esse volumus) seu
 “ major pars prædictorum triginta & unius vel plurium, de tempore in tem-
 “ pore perpetuis futuris temporibus potestatem & auctoritatem habeant & ha-
 “ bebunt nominandi & eligendi, & quod eligere & nominare possint & vale-
 “ ant, quolibet anno in prædicto festo sancti Andreæ, unum de concilio prædictæ
 “ Regalis Societatis pro tempore existente, qui sit & erit præses Regalis Societatis
 “ prædictæ usque ad festum sancti Andreæ apostoli exinde proximum sequentem
 “ (si tam diu vixerit, aut interim pro aliqua iusta & rationabili causa non amotus
 “ fuerit) & exinde, quousque unus alius in officium præfidi Regalis Societatis præ-
 “ dictæ electus & nominatus fuerit; quodque ille postquam sic, ut præ-
 “ fertur, electus & nominatus fuerit in officium præfidi Regalis Societatis præ-
 “ dictæ, antequam ad officium illud admittatur, sacramentum corporale coram con-
 “ cilio ejusdem Regalis Societatis, aut aliquibus septem vel pluribus eorum, ad
 “ officium illud recte bene & fideliter in omnibus officium illud tangentibus exe-
 “ quendum præstabit, secundum formam & effectum prædicti sacramenti, mutatis
 “ mutandis (cui quidem concilio, aut aliquibus septem vel pluribus eorum, sacra-
 “ mentum prædictum administrare pro nobis heredibus & successoribus nostris
 “ plenam potestatem & auctoritatem de tempore in tempus, quotiescunque præfi-

^a Sic in Authent.^a Sic in Authent.

“ dem

"dem eligere opus fuerit, damus & concedimus per præfentes) & quod post huiusmodi sacramentum sic, ut præfertur, præstitum officium præsidis Regalis Societatis prædictæ usque ad festum sancti Andree apostoli exinde proximum sequentem exequi valeat & possit : & si contigerit præsidem Regalis Societatis prædictæ pro tempore existentem aliquo tempore, quamdiu fuerit in officio præsidis ejusdem Regalis Societatis, obire, decedere, vel ab officio suo amoveri ; quod tunc & toties bene liceat & licebit concilio Regalis Societatis prædictæ eorumque in perpetuum successoribus, sive aliquibus undecim vel pluribus eorum, convenire vel congregari ad eligendum unum de prædicto numero concilii prædicti in præsidem Regalis Societatis prædictæ ; & quod ille, qui per concilium prædictum, vel per prædictos undecim vel plures, vel per majorem partem prædictorum undecim & plurium, electus fuerit & juratus, ut præfertur, officium illud habeat & exerceat durante residuo ejusdem anni, & quousque alius ad officium illud debito modo electus & juratus fuerit, sacramento corporali in forma supra specificata prius præstando ; & sic toties quoties casus sic acciderit. Et ulterius volumus, quod quodocunque contigerit aliquem vel aliquos de concilio Regalis Societatis prædictæ pro tempore existente mori, vel ab officio illo amoveri, vel decedere ; quos quidem de concilio Regalis Societatis prædictæ & eorum quemlibet pro male se gerendis aut aliqua alia rationabili causa amobiles esse volumus, ad beneplacitum præsidis & cæterorum de concilio prædicto (quorum præsidem pro tempore existentem, vel ejus deputatum, unum esse volumus) vel majoris partis eorundem : quod tunc & toties bene liceat & licebit præfatis prædicti concilio & sodalibus Regalis Societatis prædictæ eorumque in perpetuum successoribus, vel aliquibus viginti uni vel pluribus eorundem (quorum præsidem Regalis Societatis prædictæ pro tempore existentem, vel ejus deputatum, unum esse volumus) vel majori parti prædictorum viginti & unius vel plurium, unum alium vel plures alios de sodalibus Regalis Societatis prædictæ, loco sive locis ipsius vel ipsorum sic mortuorum decedentium vel amotorum, ad supplendum prædictum numerum viginti & unius personarum de concilio Regalis Societatis prædictæ nominare eligere & præficere : & quod ille sive illi sic in officio illo electi & præfecti idem officium habeat & habeant usque ad festum sancti Andree apostoli tunc proximum sequentem, & exinde, quousque unus alius vel plures alii electus præfectus & nominatus fuerit electi præfecti & nominati fuerint ; sacramento corporali ad officium illud in omnibus & per omnia officium illud tantum gentia coram præside & concilio Regalis Societatis prædictæ, vel aliquibus septem vel pluribus eorum (quorum præsidem pro tempore existentem, vel ejus deputatum, semper unum esse volumus) bene & fideliter exequendum, secundum veram intentionem præsentium, prius præstando. Et ulterius volumus, ac per præfentes pro nobis heredibus & successoribus nostris concedimus præfatis prædicti concilio & sodalibus prædictæ Regalis Societatis & successoribus suis, quod ipsi & successores sui, sive aliqui triginta & unus vel plures eorum (quorum præsidem pro tempore existentem, vel ejus deputatum, semper unum esse volumus) sive major pars prædictorum triginta & unius vel plurium quolibet anno, in prædicto festo sancti Andree apostoli, plenam potestatem & auctoritatem habeant & habebunt eligendi nominandi præficiendi & mutandi decem de sodalibus Regalis Societatis prædictæ, ad supplendum loca & officia decem prædicti numeri viginti & unius de concilio Regalis Societatis prædictæ ; quoniam regiam

Vol. I.

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" volun-

" voluntatem nostram esse declaramus, ac per præsentés pro nobis heredibus &
 " successoribus nostris concedimus, quod decem de concilio prædicto, & non am-
 " plius, per præsidem concilium & sodales Regalis Societatis prædictæ annuatim
 " mutati & amoti fuerint. Volumus etiam, & pro nobis heredibus & successoribus
 " nostris concedimus præfatis præfidi concilio & sodalibus prædictæ Regalis
 " Societatis, & successoribus suis in perpetuum, quod si contigerit præsidem ejus-
 " dem Regalis Societatis pro tempore existentem aegritudine vel infirmitate deti-
 " neri, vel in servitio nostro heredum vel successorum nostrorum versari, vel aliter
 " esse occupatum, ita quod necessariis negotiis ejusdem Regalis Societatis officium
 " præsidis tangentibus attendere non poterit; quod tunc & toties bene liceat &
 " licebit eidem præfidi sic detento versato vel occupato unum de concilio præ-
 " dictæ Regalis Societatis pro tempore existente, fore & esse deputatum ejusdem
 " præsidis, nominare & appunctuare: qui quidem deputatus, in officio deputati
 " præsidis prædicti sic faciendus & constituendus, sit & erit deputatus ejusdem
 " præsidis de tempore in tempus, toties quoties prædictus præfides sic abesse conti-
 " gerit, durante toto tempore, quo prædictus præfides in officio præsidis continua-
 " verit; nisi interim prædictus præfides Regalis Societatis prædictæ pro tempore
 " existens unum alium de prædicto concilio ejus deputatum fecerit & constituerit:
 " & quod quilibet hujusmodi deputatus prædicti præsidis sic, ut præfertur, faci-
 " endus & constituendus omnia & singula, quæ ad officium præsidis prædictæ
 " Regalis Societatis pertinent seu pertinere debent, vel per prædictum præsidem
 " virtute harum literarum nostrarum patensium limitata & appunctuata fore¹ faci-
 " cienda & exquenda de tempore in tempus, toties quoties prædictus præfides sic
 " abesse contigerit, durante tali tempore, quo deputatus prædicti præsidis conti-
 " nuaverit, facere & exequi valeat & possit, vigore harum literarum nostrarum
 " patentium, adeo plene libere & integre, ac in tam amplis modo & forma, prout
 " præfides prædictus, si præfens esset, illa facere & exequi valeret & posset; sacra-
 " mento corporali supra sancta Dei evangelia in forma & effectu supra specificatis
 " per hujusmodi deputatum ad omnia & singula, quæ ad officium præsidis per-
 " tinent, bene & fideliter exequendum, coram præfato concilio prædictæ Regalis
 " Societatis, vel aliquibus septem vel pluribus eorum, prius præstando; & sic
 " toties quoties casus sic acciderit: cui quidem concilio, vel aliquibus septem vel
 " pluribus eorum pro tempore existente², sacramentum prædictum administrare
 " potestatem & auctoritatem, quoties casus sic acciderit, damus & concedimus per
 " præsentés, absque brevi commissione sive ulteriori warranto in ea parte a nobis
 " heredibus vel successoribus nostris procurando seu obtinendo. Et ulterius volu-
 " mus, ac per præsentés pro nobis heredibus & successoribus nostris concedimus
 " præfatis præfidi concilio & sodalibus Regalis Societatis prædictæ & successoribus
 " suis, quod ipsi & successores sui de cætero in perpetuum habeant & habe-
 " bunt unum thesaurarium, duos secretarios, curatores experimentorum duos vel
 " plures, clericum unum vel plures, & præterea duos servientes ad clavas qui de
 " tempore in tempus super præsidem attendant; quodque prædicti thesaurarius
 " secretarii curatores clericus vel clerici & servientes ad clavas per præsidem con-
 " cilium & sodales Regalis Societatis prædictæ, sive per aliquos triginta & unum
 " vel plures eorum (quorum præsidem pro tempore existentem, vel ejus deputa-

¹ Sic in Authent.² Sic in Authent.

tum,

tum, unum esse volumus) vel per majorem partem prædictorum triginta & unius vel plurium, eligendi & nominandi, antequam ad officia sua specialia & respectiva exequendum admittantur, sacramenta sua corporalia in forma & effectu supra specificatis, coram præside vel ejus deputato, & concilio ejusdem Regalis Societatis, aut aliquibus septem vel pluribus eorum, officia sua separalia & respectiva in omnibus illa tangentibus recte bene & fideliter exequendum præstabunt; & quod post hujusmodi sacramenta sic, ut præfertur, præstita officia sua respectiva exerceant & utantur: quibus quidem præfidi & concilio, aut aliquibus septem vel pluribus eorum, sacramenta prædicta de tempore in tempus administrare prædictis separalibus & respectivis officiariis & successoribus suis plenam potestatem & auctoritatem damus & concedimus per præsentem: & assignavimus nominavimus elegimus creavimus constituimus & fecimus, ac per præsentem pro nobis heredibus & successoribus nostris assignamus nominamus eligimus creamus constituimus & facimus, dilectos subditos nostros prædictum WILLIELMUM BALLE armigerum fore & esse primum & modernum thesaurarium, & prædictum^a JOHANNEM WILKINS & HENRICUM OLDENBURG fore & esse primos & modernos secretarios prædictæ Regalis Societatis, continuandos in eisdem officiis usque ad prædictum festum sancti Andree apostoli proximum sequentem post datum præsentium: quodque de tempore in tempus & ad omnia tempora in prædicto festo sancti Andree apostoli (si non fuerit dies dominicus, & si fuerit dies dominicus, tunc die proximo sequente) præses concilium & sodales prædictæ Regalis Societatis pro tempore existentes, sive aliqui triginta & unus vel plures eorum (quorum præsidem pro tempore existentem, vel ejus deputatum, unum esse volumus) sive major pars prædictorum triginta & unius vel plurium, probos & discretos viros de tempore in tempus in thesaurarium & secretarios, qui sunt & erunt de numero concilii Regalis Societatis prædictæ, eligere nominare & præficere valeant & possint; quodque illi, qui in separalia & respectiva officia prædicta sic, ut præfertur, electi præfecti & jurati fuerint, officia illa respectiva exercere & gaudere possint & valeant usque ad prædictum festum sancti Andree extunc proximum sequentem, sacramentis suis prædictis sic, ut præfertur, prius præstandis; & sic toties quoties casus sic acciderit: Et si contigerit electiones prædictas præfidi concilii thesaurarii secretariorum, vel alicujus vel aliquorum eorum, in festo sancti Andree prædicto commode fieri vel perfici non posse, damus & concedimus prædictis præfidi concilio & sodalibus, & successoribus eorum in perpetuum, quod ipsi, vel aliqui triginta & unus vel plures eorum (quorum præsidem pro tempore existentem, vel ejus deputatum, unum esse volumus) vel major pars prædictorum triginta & unius vel plurium, licite possint nominare & assignare unum alium diem, quam proxime ad festum sancti Andree prædictum commode fieri poterit, pro electionibus prædictis faciendis vel perficiendis; & sic de die in diem, donec prædictæ electiones perficiantur: Et si contigerit aliquem vel aliquos officiariorum prædictorum ejusdem Regalis Societatis obire, decedere, vel ab officiis suis respectivis amoveri; quod tunc & toties bene liceat & licebit præfidi concilio & sodalibus prædictæ Regalis Societatis, & eorum successoribus in perpetuum, sive aliquibus viginti & uni vel pluribus eorum (quorum præsidem pro tempore ex-

^a Sic in Authent.

"istentem, vel ejus deputatum, unum esse volumus) seu majori parti prædictorum
 "viginti & unius vel plurium, alium vel alios in officium sive officia illarum per-
 "sonarum sic defunctorum decedentium sive amotarum eligere & præficere; &
 "quod ille sive illi sic electus & præfectus electi & præfecti officia prædicta re-
 "spectiva habeant & exercent durante residuo ejusdem anni, & quousque alius
 "sive alii ad officia illa respectiva debito modo electus & juratus fuerit electi & ju-
 "rati fuerint; & sic toties quoties casus sic acciderit. Et insuper volumus, ac de
 "gratia nostra speciali ac ex certa scientia & mero motu nostris concedimus præ-
 "tatis præfidi concilio & sodalibus Regalis Societatis prædictæ, & successoribus
 "suis in perpetuum, quod præfides & concilium prædictæ Regalis Societatis pro
 "tempore existentes præmissa semper in conventibus extraordinariis omnium
 "membrorum concilii prædicti debita seu legitima summonitione vel citatione)
 "sive aliqui novem vel plures eorum (quorum præsidem pro tempore existentem,
 "vel ejus deputatum, unum esse volumus) pariter congregare & assemblare possint
 "& valeant in collegio sive aula sive alio loco, conveniente intra civitatem nostram
 "Londini, vel in aliquo alio loco conveniente intra decem milliaria ab eadem ci-
 "vitate nostra; & quod ipsi sic congregati & assemblati, sive major pars eorum,
 "habeant plenam auctoritatem potestatem & facultatem de tempore
 "in tempus condendi constituendi ordinandi faciendi & stabiliendi hujusmodi leg-
 "ges statuta jura ordinationes & constitutiones, quæ eis, aut eorum majori parti,
 "bona salubria utilia honesta & necessaria juxta decem milliaria ab eadem ci-
 "vitate nostra, pro meliori gubernatione regulatione & directione Regalis Societatis
 "prædictæ & cujuscunque membri ejusdem, omniaque ad gubernationem res bona
 "facultates redditus terras tenementa hereditamenta & negotia Regalis Societatis
 "prædictæ spectantia agendi & faciendi; quæ omnia & singula leges statuta jura
 "ordinationes & constitutiones sic, ut præfertur, facienda volumus, & per præ-
 "sentes pro nobis heredibus & successoribus nostris firmiter injungendo præcipi-
 "mus & mandamus, quod de tempore in tempus inviolabiliter observata fuerint,
 "secundum tenorem & effectum eorundem: ita tamen, quod prædictæ leges sta-
 "tuta jura ordinationes & constitutiones sic, ut præfertur, facienda, & eorum quæ-
 "libet, sint rationabilia, & non sint repugnantia nec contraria legibus consuetudi-
 "nibus juribus sive statutis hujus regni nostri Angliæ. Et ulterius de ampliori
 "gratia nostra speciali ac ex certa scientia & mero motu nostris dedimus & con-
 "cessimus, ac per præsentes pro nobis heredibus & successoribus nostris damus &
 "concedimus, præfatis præfidi concilio & sodalibus prædictæ Regalis Societatis,
 "& successoribus suis in perpetuum, sive aliquibus viginti & uni vel pluribus eor-
 "um (quorum præsidem pro tempore existentem, vel ejus deputatum, semper
 "unum esse volumus) seu majori parti prædictorum viginti & unius vel plurium,
 "plenam potestatem & auctoritatem de tempore in tempus eligendi nominandi &
 "constituendi unum vel plures typographos sive impressores, & chalcographos
 "seu sculptores, & ipsi vel ipsi per scriptum communi sigillo prædictæ Regalis
 "Societatis sigillatum, & manu præfidis pro tempore existentis signatum, facultatem
 "tenem concedendi, ut imprimant tales res materias & negotia prædictam Regalem
 "Societatem tangentia vel concernentia, quales prædicto typographo vel impressori;
 "chalcographo seu sculptori, vel typographis vel impressoribus, chalcographis vel
 "sculptoribus, de tempore in tempus per præsidem & concilium prædictæ Regalis
 "Societatis, vel aliquos septem vel plures eorum (quorum præsidem pro tem-
 "pore

"pore existentem, vel ejus deputatem, unum esse volumus) vel per majorem
 "partem prædictorum septem vel plurium, commissæ fuerint; sacramentis suis cor-
 "poralibus, antequam ad officia sua exercenda admittantur, coram præfide &
 "concilio pro tempore existente, vel aliquibus septem vel pluribus eorum, in for-
 "ma & effectu ultimis¹ specificatis, prius præstandis; quibus quidem præfidi &
 "concilio, vel aliquibus septem vel pluribus eorum, sacramenta prædicta admini-
 "strare plenam potestatem & auctoritatem damus & concedimus per præsentem.
 "Et ulterius, quod prædicti præfides concilium & sodales prædictæ Regalis Societatis
 "in philosophicis suis studiis meliorem sortiantur effectum, de ampliori gratia
 "nostra speciali ac ex certa scientia & mero motu nostris dedimus & concessi-
 "mus, ac per præsentem pro nobis heredibus & successoribus nostris damus & con-
 "cedimus, prædictis præfidi concilio & sodalibus prædictæ Regalis Societatis, &
 "successoribus suis in perpetuum, quod ipsi & successores sui, sive aliqui novem
 "vel plures eorum (quorum præsidem pro tempore existentem, vel ejus deputa-
 "tum, unum esse volumus) sive major pars prædictorum novem vel plurium, de
 "tempore in tempus, habeant & habebunt plenam potestatem & auctoritatem de
 "tempore in tempus, & ad talia tempestiva tempora, secundum eorum discreti-
 "onem, per assignatum vel assignatos suos requirere capere & recipere cadavera
 "talium personarum, quæ mortem manu carnis passæ fuerint, & ea anatomi-
 "zare, in tam amplis modo & forma, & ad omnes intentiones & proposita, prout
 "præfides Collegii Medicorum & Societatis Chirurgorum civitatis nostre London
 "(quibuscumque nominibus dux prædictæ corporaciones insignite fuerint) eisdem
 "cadaveribus usi vel gavisi fuerint, aut uti vel gaudere valeant & possint. Et ul-
 "terius, pro melioratione experimentorum artium & scientiarum prædictæ Regalis
 "Societatis, de abundantiori gratia nostra speciali ac ex certa scientia & mero mo-
 "tu nostris dedimus & concessimus, ac per præsentem pro nobis heredibus & suc-
 "cessoribus nostris damus & concedimus, præfatis præfidi concilio & sodalibus
 "prædictæ Regalis Societatis, & successoribus suis in perpetuum, quod ipsi & suc-
 "cessores sui, sive aliqui novem vel plures eorum (quorum præsidem pro tempore
 "existentem, vel ejus deputatum, unum esse volumus) sive major pars prædic-
 "torum novem vel plurium, de tempore in tempus habeant & habebunt plenam
 "potestatem & auctoritatem per literas vel epistolas, sub manu prædicti præfidis
 "vel ejus deputati, in præsentia concilii vel aliquorum septem vel plurium eorum,
 "& in nomine Regalis Societatis, mutuis intelligentiis truentur² & negotiis cum
 "omnibus & omnimodis peregrinis & alienis, utrum privatis vel collegiatis, cor-
 "poratis vel politicis, absque aliqua molestatione interruptione vel inquietate³ qua-
 "cunque: proviso tamen, quod hæc indulgentia nostra sic, ut præfatur, concessa
 "ad ulteriorem non extendatur usum, quam particulare beneficium & inereffe
 "prædictæ Regalis Societatis in materiis seu rebus philosophicis mathematicis aut
 "mechanicis. Et ulterius dedimus & concessimus, ac per præsentem pro nobis
 "heredibus & successoribus nostris damus & concedimus, præfatis præfidi concilio
 "& sodalibus Regalis Societatis prædictæ, & successoribus suis in perpetuum,
 "sive præfidi & concilio Regalis Societatis prædictæ, vel majori parti
 "eorum, plenam potestatem & auctoritatem erigendi ædificandi & extruendi, aut
 "etiam ædificari & extrui faciendi vel causandi, intra civitatem nostram Londini,

¹ Sic in Authent.² Sic in Authent.³ Sic in Authent.

" vel

“ vel decem millaria ab eadem, unum vel plura collegium vel collegia cujuscunque modi & qualitatis, pro habitatione assemblatione & congregatione prædictorum præsidis concilii & sodalium prædictæ Regalis Societatis & successorum suorum, ad negotia sua & alias res eandem Regalem Societatem concernentes ordinandum & disponendum. Et ulterius volumus, ac per præsentés pro nobis heredibus & successoribus nostris ordinamus constituimus & appunctuamus, quod si aliqui abusus vel discrepantiæ in posterum orientur & accident de gubernatione aut aliis rebus vel negotiis prædictæ Regalis Societatis, unde ejusdem constitutioni stabilimini & studiorum progressui vel rebus & negotiis aliqua inferatur injuria vel impedimentum; quod tunc & toties per præsentés pro nobis heredibus & successoribus nostris authorizamus nominamus assignamus & constituimus præfatum prædilectum & perquam fidelem consanguineum & consiliarium nostrum EDWARDUM comitem de CLARENDON cancellarium nostrum regni nostri Angliæ, per seipsum durante vita sua, & post ejus mortem tunc archiepiscopum Cantuariensem, cancellarium vel custodem magni sigilli Angliæ, thesaurarium Angliæ, custodem privati sigilli, episcopum Londinensem, & duos principales secretarios pro tempore existentes, aut aliquos quatuor vel plures eorum, eandem discrepantias & abusus reconciliare componere & reducere. Et ulterius volumus, ac per præsentés pro nobis heredibus & successoribus nostris firmiter injungendo præcipimus & mandamus omnibus & singulis justitiariis, majoribus, aldermannis, vicecomitibus, balivis, constabulariis, & aliis officiariis ministris & subdnis nostris heredum & successorum nostrorum quibuscunque, quod de tempore in tempus sint auxiliantes & assistentes prædictis præsidi concilio & sodalibus Regalis Societatis prædictæ, eorumque in perpetuum successoribus, in omnibus & per omnia, secundum veram intentionem harum literarum nostrarum patentium. Eo, quod expressa mentio de vero valore annuo, vel de certitudine præmissorum sive eorum alicujus, aut de aliis donis sive concessionibus per nos seu per aliquem progenitorum sive prædecessorum nostrorum præfatis præsidi concilio & sodalibus Regalis Societatis prædictæ ante hæc tempora factis, in præsentibus minime facta exiit, aut aliquo statuto actu ordinatione provisione proclamatione sive restrictione in contrarium inde antehac habitis factis editis ordinatis sive provisus, aut aliqua alia re causa vel materia quacunque, in aliquo non obstante. In cujus rei testimonium has literas nostras fieri fecimus patentes. Teste me ipso apud Westmonasterium, vicesimo secundo die Aprilis, anno regni nostri decimo quinto.

“ Per breve de privato sigillo.

“ HOWARD.”

April 29. MR. LOUTHER and MR. SPRAT were admitted.

DR. WREN shewed his model of the theatre to be built at Oxford for the University acts, and upon occasion for plays; and was desired to give in writing a scheme and description of the whole frame of it, to remain as a memorial among the archives of the society.

MR.

Mr. LONG gave some account of the generation of ants, how they come out of the pods full of eggs, which receive immediately the male, and then become ants: and it was observed, that they were maggots, that come out of the pods, since they appear in the microscope to move and gape:

He remarked, that he had seen the maggot under a stag's tongue.

He made also the experiment of killing water-newts with bay-salt, wormwood-salt, and *sal prunelle*; the first killing them more slowly than the two other. They being put into fresh water, did not recover.

He mentioned, that the land-newts are more noxious than the water-newts; and that toads, though they are not venomous in the cool and moist season of the spring, yet are so in the heat of the summer, especially in Italy and such like hot countries. He added, that a toad in the height of summer being broken, infects and poisons with its very steam.

The experiment with bay-salt, &c. was ordered to be made upon toads, both male and female; and the operator was directed to provide some of them against the next meeting.

Dr. CROUNE affirmed, that he had seen a true viper with a young live one in its belly.

Mr. LONG mentioned, that the female viper hath four teeth, two above and two below; but the male only two, and those above.

Dr. GODDARD's glass with stale vinegar was produced, which had been kept close stopped with a cork for five or six days; whereby most of the little leeches swimming therein were killed, appearing now stretched out in length, and so floating and moved up and down, but not moving themselves, or wriggling as they do when alive.

Mr. BOYLE was desired to communicate his papers concerning the manner, in which his father, the earl of Corke, had carps transported into Ireland, where they were not before.

Sir ROBERT MORAY mentioning a way used in Scotland for producing fish, where they were not, by transporting of spawn, was desired to make a full inquiry after it, and to communicate it to the society; which he promised to do.

Mr. HOOKE produced two microscopical observations, one of a mine of diamonds usual in flints; the other a spider appearing to have six eyes: but this latter was not yet perfectly drawn.

The *virgula divina* was ordered to be tried at the next meeting, Mr. BOYLE and Mr. BRERETON assenting to have seen it succeed in the hands of others, though theirs

were not so lucky as to have that effect performed by them. The operator was ordered to desire the apparatus from Mr. BRERETON, to be tried both by the naked hand, and after the way practised by GABRIEL PLATT, printed in his treatise, intitled, *A Discovery of subterranean treasures*, p. 12.

Mr. BOYLE was again desired to speak with the artist about the method of softening wood, and hardening it again.

Sir ROBERT MORAY related, that an old watch, when to be mended, was found to have the steel so hard, that it could not be filed, either before it was heated, or after it was cooled again, but only whilst it was red hot.

Mr. LONG mentioned to have seen a breast piece so tough, that it could not be pierced by a pistol-bullet, but was only indented.

Col. TUKE was desired to take an occasion to speak with his highness prince RUPERT, concerning the way of tempering steel to that toughness, that it will not easily be pierced; and to see whether he would please to discover it in favour to the society.

Dr. CROUNE's three experiments, brought in at the last meeting, were read, and ordered to be registered*, as follows :

“ EXPERIMENT 1.

“ An egg being put into half a pint of Champagne wine, first a great number of small bubbles rose up to the surface of the wine, and there remained in the exact figure of the egg. Then being left in twenty-four hours, there was a hard tartarous matter adhered to the shell, of a sad redish colour. This egg was taken out, and another put in, and after that another, to the number of five, all which had a quantity of the same matter crufted about the shell; but the latter less than the former, and the wine in about a week's time lost its colour, standing open in the air in a broad glass, and looked like strong-beer in the glass.

“ Another single egg being left in the like quantity of the same sort of wine a week, the shell was corroded by the liquor in several places, which did not happen before.

“ EXPERIMENT 2.

“ There were put into the ventricle taken out of a person executed about five pints of French wine, of which in three days time a pint and a half transuded through the pores. In the same manner it passed through that gut, which is commonly called the *duodenum*, but through the *ileum* in a much shorter time. It brought with it through the pores of the *duodenum* much of the mucus, that lines that gut.

* Printed at London in 1539, in 4to.

* Original Register, vol. ii. p. 218.

"EXPERIMENT 3.

"A carp being hung up in filliting, so fitted that it might conveniently swallow, and sack and bread being given it, put with a little spoon into the mouth, it would not (as far as could be discovered) swallow it, and after four or five hours time died. This trial was made in Dr. GODDARD'S cellar."

Dr. CROUNE was desired to try the experiment of transfusion upon the ventricle of a live dog, and to repeat that of the carp with as much care as possible; and that of the egg with small pieces of an egg-shell put into a glass with wine luted up.

Mr. BOYLE mentioned, that he had tried the experiment of the egg in sack, and found it also incruited with tartarous matter.

It was queried, whether this was done by precipitation or corrosion.

Dr. CROUNE was desired to give an account in writing of the bladder of the tench killed in the engine; which bladder, he said, was found flat, but expanded itself again, when put into the engine, upon the exhausting of the air.

Dr. WREN was desired to acquaint Mr. HOOKE with the apparatus and progress, which he had made in the experiment of hatching eggs by the equal and moderate heat of a lamp, in order to prosecute the experiment, which was said to have been so far advanced, as that thereby blood was produced in eggs.

In the survey of the zodiac the lord viscount BOUNCKER and Sir ROBERT MORAY assigned to themselves Sagittarius; Mr. BALLE Libra; Dr. POPE and Dr. CROUNE Aries; Dr. WREN and Mr. HOOKE Taurus.

Mr. BOYLE was desired to try, whether highly rectified spirit of wine and camphire dissolved in it will flame away together.

May 6. Mr. BOYLE made the experiment of spirit of wine highly rectified and camphire dissolved in it, which burnt all away, the flame being on the top whitish and blue beneath.

He made likewise an experiment of a body swimming in water, and by the addition of more water sinking to the bottom, and by the diminution thereof swimming again. The body swimming was a little glass bubble open at one end, and containing a bubble of air with water. The vessel, in which this was exhibited, was a pipe of five or six feet long. And the like phenomenon followed on the blowing in of air, and drawing it out again. Mr. BOYLE being desired to bring in a full account of this in writing, declared his intention of publishing it in a treatise of his to be printed.

Mr. AUBREY mentioned, that holly-berries, after they have lain five or six hours at the bottom of a vessel with water, will rise and swim in the middle thereof:
Vol. I. H h which

which was thought to be caused by a kind of fermentation and swelling, and thereby taking up more space. The experiment was ordered to be tried in winter.

He suggested, that grains of wheat, if good and sound, will sink in water, and by sinking get a bubble of air sticking to them; and after some time rise again, the bubble breaking, and then sink the second time to the bottom, but never rise again. This he said he had tried with all other sorts of grain, except rye, but none of them did the like.

The *virgula divina* was tried, but by unlucky hands. It was ordered to be tried again with shoots of one year's growth, and after GABRIEL PLATT's method, tying the end of the hazel to a staff in the middle with a strong thread, so that it hang even, like the beam of a balance.

A toad and slow worm were killed by throwing salt of tartar and common salt upon them.

Mr. HOOK exhibited a microscopical observation of a female gnat, distinguished from the male by the bigness of her belly; that of the male being thin and lank, the male having also a tuft.

He being asked, whether he had received from Dr. WREN an account of the way of hatching eggs by a lamp, answered, that he had received it in good part; and that the doctor had promised to communicate the rest to him.

Monsieur DE LA QUINTINYE's letter was read, excusing his not communicating for the present his discourse and experiments of the culture of trees, and promising to continue his labors upon that subject; and intimating his inclination, after more advancement in it, to publish it.

Mr. BEAL's offer of sending to the society some hortulane discourses in manuscript of Dr. JUNIUS, and CALEB MORLEY's mnemonical scrolls, together with his explication, was accepted of.

SIR ROBERT MORAY mentioned, that the earl of SANDWICH had assured him, that at the depth of sixty fathom water, six men could pull up an anchor; which, when it came near the surface, ten men could scarce do.

SIR ROBERT moved, that it might be tried, whether bodies would vary in their weight, being sunk under water, as they will do, being let down into deep mine-pits, according to Dr. POWER's experiment, wherein a brass-lamp, that was of an exact pound weight at the top of the pit, weighed at the bottom thereof, being sixty-eight yards distant from the top, lighter by an ounce at least.

Mr. HOOKE was ordered to bring in some experiments upon every head of those queries, which he brought in writing at this meeting, concerning the condensation of air, in order to make them in the compressing engine. The said queries were ordered to be entered*, and were as follow:

* Original Register, vol. ii. p. 219.

1. " To what degree the air may by this means be condensed ?
 2. " What strength is requisite to condense it into several degrees ?
 3. " What bodies will suffer a condensation ? as what liquors, whether water, quicksilver, oil, spirit of wine, &c. What solid bodies ? as metals, glass, stones, &c.
 4. " With what force it will be able to shoot a solid body ? as a bullet ? or a fluid ? as water, &c.
 5. " What bodies the air, or other liquors may be forced into or through ? as whether through lead, tin, iron, brass, box, ivory, &c. Whether the air may be forced into liquors ? as water, wine, &c.
 6. " How much heavier the condensed air will be ; or how much the weight of a light bulky body will be altered ? as whether it may be made heavy enough to make a feather, the pith of elder, cork, or the like, swim or float at the top of the air.
 7. " Whether some fluid bodies will not grow solid and fixed, whilst they remain under a pressure ?
 8. " Whether the congruity and incongruity of some bodies will not be changed ? that is, whether some liquors, that were before congruous and mixt, will not prove incongruous and separate from each other ? and the contrary.
 9. " Whether there will be any variation in the rising of liquors in small pipes ? and whether filtration would be hindered or promoted ?
 10. " What variation there will be found in the refraction of the rays of light ?
 11. " Whether the air may not grow thicker ? that is more opacous.
 12. " What variation there will be found, as to heat and cold ?
 13. " Whether fire will last much longer, or be sooner extinguished ?
 14. " Whether the smoke will at all descend, or not rather float at the top like a cloud ?
 15. " What hindrance bodies will suffer in their motions through it ? as how much slower a pendulum will vibrate, &c.
 16. " What animals will live in it, and what die ?
- " How those that live endure it ? whether pleasantly or with regret : if it seem painful to them and offensive ? whether it make them nimble and acute, or dull and sleepy, &c.

H h 2

" Whether

"Whether fishes will live in water under a pressure? what they are, and how they endure it?"

"Whether with pressure they will grow heavy and sink to the bottom of the vessel? whether several bodies, that will swim in water in open air, will not sink by the increase of pressure?"

May 13 The council of the society met for the first time this day*, there being present the following persons:

| | |
|------------------------------|-----------------------|
| The lord viscount Brouncker. | Dr. Jonathan Goddard: |
| Sir Robert Moray. | Dr. Timothy Clarke. |
| Mr. Robert Boyle. | Dr. William Balle. |
| Sir Gilbert Talbot. | Mr. John Evelyn. |
| Mr. William Aerskine. | Mr. Dudley Palmer: |
| Mr. Henry Slingsby. | M. Abraham Hill. |
| Dr. John Wilkins. | Mr. Henry Oldenburg. |
| Dr. George Ent. | |

The new charter of the society was read before them, wherein the members of the council were nominated, as follows:

| | |
|------------------------------|----------------------------------|
| The lord viscount Brouncker, | William Aerskine, esq; |
| president. | John Wilkins, D. D. Secretary. |
| Sir Robert Moray. | George Ent, M. D. |
| Robert Boyle, esq; | Jonathan Goddard, M. D. |
| William Brereton, esq; | William Balle, esq; Treasurer. |
| Sir Kenelm Digby. | Matthew Wren, esq; |
| Sir Paul Neile. | John Evelyn, esq; |
| Sir Gilbert Talbot. | Thomas Henshaw, esq; |
| Henry Slingsby, esq; | Dudley Palmer, esq; |
| Sir William Petty, esq; | Abraham Hill, esq; |
| Timothy Clarke, M. D. | Henry Oldenburg, esq; Secretary. |

The members of the council present were sworn by the president; and Mr. Balle was also sworn as treasurer, and Dr. Wilkins and Mr. Oldenburg as secretaries.

Mr. Wicks was sworn as clerk.

It was ordered, that the debate concerning those, who were to be received and admitted into the society, be kept under secrecy: And

That all those, who had met hitherto as fellows of the Royal Society on Wednesdays in the afternoon, shall be admitted to sit with the present fellows of the society till farther order.

* Council-book of the Royal Society, vol. i.

The

The collecting of arrears being thought necessary, the following order was drawn up concerning the same :

“ Wednesday May 13, 1663.

“ At a meeting of the council of the Royal Society.

“ Ordered, that all persons, that have been elected or admitted into the Royal Society, do pay their whole arrears unto this day, according to their subscription ; and that the treasurer, or collector by him appointed, do repair to every such person, and demand the said arrears, shewing unto him this order, together with the form of the subscription herunto annexed.

Signed by the President.

The form of the Subscription.

“ We, whose names are under-written, do consent and agree, that we will meet together weekly (if not hindered by necessary occasions) to consult and debate concerning the promoting of experimental learning : and that each of us will allow one shilling weekly towards the defraying of occasional charges : provided, that if any one, or more of us, shall think fit at any time to withdraw, he or they shall, after notice thereof given to the company at a meeting, be freed from this obligation for the future.”

It was ordered, that a short extract be made by Dr. GODDARD of the heads of the charter for the use of the council.

At a meeting of the SOCIETY on the same day *,

The operator was charged to provide frogs and toads against the next meeting, and some pitch and tar, to be put upon their backs, according to Mr. HENSHAW's suggestion.

The earl of KINCAIRDIN was desired to try in his coal pits in Scotland those subterraneous experiments formerly suggested by Sir ROBERT MORAY, and in part tried by Dr. POWER.

Sir JAMES SHAEN was desired to take care, that English earth and toads be sent over into Ireland, and to recommend it to the members of the society there to try, whether toads do presently dry upon Irish earth : as also to have some Irish earth and wood transported into England, to examine what is in them peculiar.

It was ordered, that the lord viscount MASSAREENE be desired to inform the society concerning the transmutation of holly into iron, as far as it is stuck into the ground under the water of a lough, called ‘, and into stone as far as it stands in that water, remaining wood as far as it is extant above the water.

* Monsieur DE MONCONYS, who was present at this meeting, gives some account of what passed there in his *Voyage d'Angleterre*, p. 45, & seq. Edit. Paris, 1695.

* The name is wanting in the journal : but Monsieur DE MONCONYS says, p. 46, that it was called *Erno*.

Mr.

Mr. HENSHAW related, that an artist in Italy had hardened tools of steel in *branca urfina*, in order to make them cut porphyry.

The operator was ordered to try Mr. AUBREY's experiment of sinking wheat into common water; and to observe, whether, after two or three days, it swims again.

The lord viscount KINCARDIN confirmed Sir ROBERT MORAY's relation of the way of breeding fish by transporting spawn, and was desired to inform the society of the whole manner thereof, how, and in what season the spawn must be gathered, how managed, and in what sort of fishes it hath been practised.

The operator was ordered to provide some fishes full of spawn, as perches, flounders, and gudgeons; and to put them into a great glass of water, to observe the spawn when cast.

The lord viscount BOUNCKER undertook to put some fishes big with spawn into his cistern at Whitehall, in order to observe the spawn.

Mr. HENSHAW mentioned, that he had seen an eel choaked with a water-rat, the two hind legs thereof hanging at the eel's mouth.

Mr. NEILE remarked likewise, that he had seen an eel in St. James's Park with a duck in his mouth.

Mr. EVELYN gave some account of the experiment recommended to him, of putting some flesh and blood in a vessel covered with flannel, in order to see what insects it would breed; and he observed, that it had hitherto bred nothing. He was desired to continue and prosecute this experiment.

Mr. HOOKE made two experiments, one of a carp, included in a vessel of water, out of which the air was exhausted; the other, of extracting the air out of water; which air, after some time, will return into water again. He was ordered to bring in an account of the success of these experiments in writing.

DAVID BRUCE, M. D. was proposed as a candidate by the lord viscount KINCARDIN.

The experiments appointed for the next meeting were :

1. That of descending bodies in a receiver emptied of air.
2. That of putting water purged of air into the engine.
3. Of condensing air in the new compressing engine.
4. Of killing a mouse or frog in the said engine.

May

May 20. The coucil sat, there being present,

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| The lord viscount Brouncker, | Mr. BALLE. |
| president. | Mr. HENSHAW. |
| Sir ROBERT MORAY. | Mr. EVELYN. |
| Mr. BOYLE. | Dr. GODDARD. |
| Sir GILBERT TALBOT. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. SLINGSBY. | Mr. OLDENBURG. |

Mr. HENSHAW was sworn of the council.

Dr. BRUCE and PETER BALLE, M. D. (the former proposed by Sir ROBERT MORAY, the latter by his brother Mr. WILLIAM BALLE) were elected into the society by the council.

It was considered again, who should be received as fellows into the society; and the following persons were unanimously resolved upon to be published this day in the afternoon at the meeting of the society.

Wednesday, May 20, 1663.

Resolved unanimously by the council of the Royal Society, that all the persons in the following list be received, admitted, and ordered to be registered fellows of the Royal Society.

| | |
|------------------------------------|------------------------------------|
| WILLIAM lord BROUNCKER, president. | WILLIAM lord CAVENDISH. |
| JAMES lord ANNESLEY. | WALTER CHARLETON, M. D. |
| WILLIAM AERSKINE, esq; | TIMOTHY CLARKE, M. D. |
| JOHN ALLEYN, esq; | EDWARD COTTON, D. D. |
| ELIAS ASHMOLE, esq; | DANIEL COLWALL, esq; |
| JOHN AUSTEN, esq; | JOHN CLAYTON, esq; |
| JOHN AUBREY, esq; | THOMAS COX, M. D. |
| | WILLIAM CROUNE, M. D. |
| | JOHN earl of CRAWFORD and LINDSEY. |
| GEORGE duke of BUCKINGHAM. | |
| GEORGE lord BERKELEY. | HENRY marquis of DORCHESTER. |
| ROBERT lord BRUCE. | WILLIAM earl of DEVONSHIRE. |
| ROBERT BOYLE, esq; | Sir KENELME DIGBY, knr. |
| RICHARD BOYLE, esq; | Sir JOHN DENHAM, knight of the |
| WILLIAM BRERETON, esq; | Bath. |
| THOMAS BAYNES, M. D. | JOHN DRYDEN, esq; |
| ISAAC BARROW, B. D. | |
| WILLIAM BALLE, esq; | SETH lord bishop of EXETER. |
| PETER BALLE, M. D. | GEORGE ENT, M. D. |
| JOHN BROOKE, esq; | JOHN EVELYN, esq; |
| DAVID BRUCE, M. D. | ANDREW ELLISE, esq; |
| GEORGE BATE, M. D. | |

Sir

Sir FRANCIS FANE, *knt.* of the Bath.
 Sir JOHN FINCH, *knt.*
 MONT. LE FEBURE.

FRANCIS GLISSON, *M. D.*
 JONATHAN GODDARD, *M. D.*
 JOHN GRAUNT, *esq;*

CHRISTOPHER lord HATTON.
 CHARLES HOWARD, *esq;*
 WILLIAM HOARE, *M. D.*
 Sir ROBERT HARLEY, *knt.*
 NATHANIEL HENSHAW, *M. D.*
 THOMAS HENSHAW, *esq;*
 JAMES HAYES, *esq;*
 WILLIAM HOLDER, *D. D.*
 THEODORE HAAK, *esq;*
 WILLIAM HAMMOND, *esq;*
 ABRAHAM HILL, *esq;*
 JOHN HOSKINS, *esq;*
 Mr. ROBERT HOOKE.

RICHARD JONES, *esq;*

ALEXANDER earl of KINCARDIN.
 Sir ANDREW KING, *knt.*

JOHN lord LUCAS.
 JAMES LONG, *esq;*
 ANTHONY LOWTHER, *esq;*

JOHN lord viscount MASSARENE.
 Sir ROBERT MORAY, *knt.*
 Sir ANTHONY MORGAN, *knt.*
 CHRISTOPHER MERRET, *M. D.*

JAMES earl of NORTHAMPTON.
 Sir PAUL NEILE, *knt.*
 Sir THOMAS NOTTE, *knt.*
 WILLIAM NEILE, *esq;*
 JASPER NEEDHAM, *M. D.*

HENRY OLDENBURG, *esq;*

Sir WILLIAM PERSALL, *knt.*
 Sir WILLIAM PETTY, *knt.*

Sir RICHARD POWLE, knight of the Bath.

Sir ROBERT PASTON, *knt.* and *bart.*
 Sir PETER PETT, *knt.*
 WALTER POPE, *M. D.*
 JOHN PELL, *D. D.*
 PETER PETT, *esq;*
 HENRY POWLE, *esq;*
 THOMAS POVEY, *esq;*
 DUDLEY PALMER, *esq;*
 HENRY PROBY, *esq;*
 PHILIP PACKER, *esq;*

WILLIAM QUATREMAIN, *M. D.*

EDWARD earl of SANDWICH.
 Sir JAMES SHAEN, *knt.*
 CHARLES SCARBURG, *M. D.*
 THOMAS STANLEY, *esq;*
 GEORGE SMITH, *M. D.*
 HENRY SLINGESBY, *esq;*
 ALEXANDER STANHOPE, *esq;*
 ROBERT SOUTHWELL, *esq;*
 WILLIAM SCHROTER, *esq;*
 THOMAS SPRATT, *M. A.*

Sir GILBERT TALBOT, *knt.*
 CHRISTOPHER TERNE, *M. D.*
 SAMUEL TUKE, *esq;*

CORNELIUS VERMUYDEN, *esq;*

Sir CYRILL WYCHE, *knt.*
 Sir PETER WYCHE, *knt.*
 JOHN WILKINS, *D. D.*
 JOHN WALLIS, *D. D.*
 DANIEL WHISTLER, *M. D.*
 EDMUND WALLER, *esq;*
 JOSEPH WILLIAMSON, *esq;*
 FRANCIS WILLUGHBY, *esq.*
 WILLIAM WINDE, *esq;*
 JOHN WINTHROP, *esq;*
 MATTHEW WREN, *esq;*
 THOMAS WREN, *M. D.*
 CHRISTOPHER WREN, *LL. D.*
 EDMUND WYLDE, *esq;*

It was voted, that the persons following be a committee, to consider and make report of the statutes of the society, viz.

Sir ROBERT MORAY.
Mr. BOYLE.
Mr. SLINGSBY.
Dr. WILKINS.
Dr. GODDARD.

Dr. ENT.
Mr. PALMER.
Mr. HILL.
Mr. OLDENBURG.

And that any three of them be a quorum.

It was resolved, that there should be an obligation, to be subscribed by every fellow of the society :

That the committee of the council should consider of the said obligation : And

That Sir WILLIAM PERSALL, Dr. CHARLETON, Mr. PELL. and Monf. LE FEBURE, be dispensed with for their whole weekly payments ; and Dr. WALLIS and Dr. CHRISTOPHER WREN, for the half thereof.

Of these, Dr. CHARLETON and Mr. PELL had been formerly, viz. Aug. 13. 1662, exempted from all payments ; and Dr. WALLIS and Dr. WREN, from half, on Dec. 3. 1662.

It was resolved, that no person be registered fellow of the society until he shall have subscribed such obligation as the council should agree upon.

At the meeting of the SOCIETY in the afternoon of the same 20th of May *, the experiments of killing frogs with pitch, quicksilver, and vinegar, was made. It did not succeed with quicksilver and vinegar, but a good quantity of pitch being put upon one, killed it at last.

Mr. WALLER mentioned, that toads love to come abroad out of the woods and other shady places in moist and cool weather : And Col. LONG added, that they use to walk a good way off from their farms, and return into the same. He also suggested a means of driving frogs and toads out of ponds, as well of stagnant as running waters, by burning old shoes, and putting them at the head of the pond where the water comes in ; affirming to have seen them come out by hundreds upon the use of this trick.

Mention being made of toads infesting sage, Mr. WALLER alledged, that it had been observed in a microscope, that sage hath little cavities, used to be filled with small spiders ; and that this was the cause, which made the plant noxious, if not well washed.

* Monf. de MONCONYS was present at their meeting. See his *Voyage d'Angleterre*, p. 68, 69, 70.

Col. LONG having related divers considerable observations of his concerning insects, and having made a collection thereof, was desired to communicate them, and to continue his curiosity, in observing farther their various productions and changes, at what times, and upon what plants or leaves they breed, how much time they take for their changes, &c.

He took particular notice, that even bitter herbs have their insects, as rue particularly hath a caterpillar, that feeds upon it, as silk-worms do upon mulberry-leaves.

Mr. PELL observed, that silk-worms, after they were changed into butterflies, and had laid their eggs, and died, being put up by himself into a wooden box tied over with a paper cover, produced, after some time, a sort of flies, which eat through the wood. This was mentioned, in order to excite others to observe more than had been hitherto done, the changes of insects after they are dead.

Col. LONG remarked, that he used to line the inside of the boxes, wherein he shut up insects, with camphire, to prevent the insects from boring them through.

Mr. WALLER related, that in an iron candlestick, such as wax-candle is wound upon, after the candle was burnt down to that part, which clasps it in, and had heated it, there was heard about that part a noise like that of a death-watch, continuing for a while, and then ceasing; and that putting his finger upon it, when somewhat cooled, he found the iron beat like a pulse.

Col. LONG seconded him, and said, than an iron back in a chimney well heated, useth to make a noise like that of bell-metal.

Mr. HOOKE added, that blowing a glass ball with a lamp, after it was come to a certain degree of heat, he had heard a sound in it like that, which is made in the experiment of drawing a wet finger about the lip of the glass with water, which there by that pressure is made to rick. He observed farther, that the glass being all red-hot, the noise ceased; but returning, in the cooling, to the former degree, was heard again till it became cold, and so ceased.

Dr. GODDARD mentioned, that wainscotted rooms were heard to make a crackling noise in the mornings and evenings, according to the various temper of the air as to moist and dry.

Col. LONG related, that he had seen young ash-trees grown upon a rotten block of ash-wood in such a manner, that they were sprung up, and had their roots, in the very rotten part of the stump; adding, that these young trees, thus sprung up, being transplanted, grew up and thrived like other trees; and that there was no other ash-wood near to that place where the said block stood: so that there could be no suspicion of ash-keys blown from thence to that rotten ash.

Mr. BOYLE said, that the very stems of potatoes being put into the ground alone produce good roots.

Col. LONG observed, that a bean cut into two or three pieces produces good beans.

Mr. WALLER related, that in a beech-wood of his, the beech being cut down, other kinds of trees succeeded, as hazels, willows, and fallows, that had never grown there before.

Sir ROBERT MORAY mentioned, that in Scotland, at Darnway, on the river Tindarne, in the province of Moray, where nothing had grown but oak, in a wood three miles long, there grew then nothing but birch; and that he had seen in the same wood a birch grown out of an oak.

Dr. WHISTLER observed, that darnel never comes, but where wheat or other corn grows.

Col. LONG said, that in any new ground, as in ditches newly thrown up, blue-bottles, poppies, &c. will grow.

Mr. PACKER affirmed, that in Surrey, near Mr. GEORGE EVELYN's house at Wotton, a whole wood of oaks being cut down, nothing but beech was grown instead of it.

Mr. HENSHAW mentioned, that he had seen a great holly grown out of an ash-tree.

Mr. BRERETON related, that in the marshes or boggy grounds of Cheshire, there are found, buried under ground, firs and firm black oak.

He mentioned likewise, that serjeant NEWDIGATE had assured him, of his having often seen, in Northamptonshire, a tree cut in the middle, the heart of which was ash-wood, and the exterior parts oak.

Mr. PACKER said, that he had seen an elm in Berkshire, about a mile from Farringdon, which had been cut towards the root, and was in the cut part petrified. He was desir'd to produce that outwardly petrified piece, which he said he had of that wood.

Mr. HOSKYNs moved, that a good inquiry should be made into those subterraneous trees, that are found buried under ground in Cheshire, Lancashire, and elsewhere. The consideration of this was referred till the next meeting; as also that of the trees said by Col. LONG to be found in his mines.

Mr. HOOKE produced three microscopical observations: 1. Of the head of an ant: 2. Of a strange fly like a gnat: 3. Of the point of a needle.

Dr. GODDARD produced a curious piece of petrified wood, which was given to Mr. HOOKE to have it cut even, in order to see, whether it would polish.

Dr. CHARLETON undertook to shew in a fish the *dustus* from the bladder to the gills; and the operator was ordered to provide a brace of carps against the next meeting.

Dr. BRUCE and Dr. BAILE were elected into the society by the council, according to the power granted to the council by the charter for the space of two months from the date of it.

Dr. CROUNE brought in the following account of a tench tried in the exhausting engine¹.

“ A tench being put into the receiver, and the air exhausted, died: her belly was opened, and the swim or bladders were found flat and empty, and sunk down close upon the back and sides. To find whether they were broken, or only the air sucked out, and the bladders left whole, the fish was again put into the receiver, and the air being pumped out, the bladders were distended, as if they had been full blown: from whence it was thought, that while the fish was alive, the air was drawn out by some duct, through which she takes it in; but after she was killed, that passage was closed up with clammy and glutinous matter: which happens upon the subsiding of all parts in dead creatures.”

Mr. HOOKE brought in likewise the following account of what happened to a carp included in a vessel of water, out of which the air was pretty well exhausted².

“ A middle-sized carp was put into a vessel of water, which was afterwards closed up and pretty well evacuated of air: this carp, all the time the air was exhausting, was observed to float at the top of the water; and though by struggling it endeavoured to get to the bottom of it, yet it no sooner ceased that endeavouring, but it was buoyed up to the top. After the vessel was pretty well emptied, the air was readmitted, and thereupon the carp sunk down to the bottom of the vessel like a stone, not at all moving its body, but only breathing the water (if I may so call that action, by which fishes take in the water at their mouths, and force it out at their gills) then being taken out of the vessel, it was very dexterously and carefully opened by Dr. CLARKE, who found, that the bladder was manifestly broken in two places.”

May 27. Col. LONG observed, that the glass was blasted where toads live; and that the surface of such blasted earth being taken away, several toads were found lying under it.

¹ Original Register, vol. ii. p. 224.

² Ibid.

Mr. HOOKS was charged to look upon sage with a microscope, and to observe, whether there lurked any little spiders in the cavities of the leaves, that might make them noxious.

Dr. POPE said upon this occasion, that spiders seemed to be poisonous, because he had observed, that a fly bit by a spider died immediately; whereas another fly, whose head is pulled off, will stir a pretty while after it. To this Col. LONG added, that a merlin would kill a partridge presently, so that it should lie quite motionless; whereas another partridge, whose head was wrung off, would flutter a while after: which made him surmise, that in both cases the fright might rather be the cause of the sudden death than any poison.

Col. LONG desired farther time to make his collection of insects for a present to the society.

He shewed an ermin, taken in Wiltshire about Dracot, as white as those that come from abroad, and having likewise the tail black.

Sir ROBERT MORAY recommended the improvement of silk-making heretofore begun in England. In order to which it was suggested, that white mulberries should be increased; for which their growth by cuttings put in good ground was by Col. LONG preferred as more speedy, before their propagation from roots. It was also mentioned, that eggs of silk-worms brought from abroad out of warmer countries, would thrive better; Monsieur MONCONYS affirming, that in France they send for eggs out of Italy, and offering himself to procure a good quantity of them; as also to give a full account of the way used in France in ordering silk-worms.

Mr. HOWARD was desired to pursue the planting of mulberries.

Mention was made of Dr. BRIAN, a clergyman of Coventry, who had so much silk made by his family, that they furnished themselves with silk-stockings.

Col. LONG affirmed, that in the Indies the silk-worm-flies having eat themselves out of the balls fly away to the mulberries, laying eggs upon the leaves thereof, which vivify and feed there, &c.

Sir ROBERT MORAY gave occasion to inquire of what importance the custom was of changing seed-corn every year: concerning which Col. LONG thought it a point of great advantage to change the ground from worse to better, and to sow lean and small corn in richer soil. He added, that though husbandmen seldom sow the same grain in the same ground; yet he knew barley to be sown upon the same land for several years together with good success. He observed farther, that corn will smut, if from one rich ground it be sown upon another rich ground; but not so much the second as the third and following years.

Mr. BRERETON mentioned, that in Cheshire, in order to preserve corn from smut, as also from being eaten by birds, they steep it in brine sprinkled with lime.

Mn.

Mr. Hoskins said, that Col. SANDYS intended to bring gravel from the sea-shore out of Cornwall into Herefordshire, to manure the ground with.

Sir ROBERT MORAY inquired, whether manuring the ground with lime, makes wheat more wholesome or not? Col. LONG said, that the sign of the wholesomeness of corn being to keep well; and corn grown from lime or other good natural manure, keeping better than from compost or dung, or other foul manure, it was manifest, that liming the ground made the corn wholesome. He observed farther, that asparagus, and other herbs growing from rank manure, were not so good, nor so firm or well tasted, as those that grew from a good natural soil, or from a clean manure.

Mr. AUBREY mentioned, that liming the ground altered the wool for the worse; and that it was found so by experience in Herefordshire.

Mr. BALLE said, that though wool grew coarser from limed ground, yet the sheep thrived better by it; which he said he had observed in Devonshire.

Mr. BRERETON remarked, that sheep without horns, if brought into a wood-land or downs, or other hard country, will get horns in a few generations; and, on the contrary, if they come out of a wood-land country into a low-land and rich pasture, lose their horns.

Col. LONG affirmed, that the large-horned oxen, brought into Somersetshire, or other rich soil, get short heads.

The odd production of trees of different kinds growing upon one another being mentioned again, Dr. GLISSON observed, that an ash sometimes grows upon a willow; and that himself had seen an ash so grown upon the head of a rotten willow, that it had shot its root through it into the ground, and grew up, thrusting the willow out of its place.

Sir ROBERT MORAY related, that in Scotland, near Lough-brum, between the lough and a hill, there was an old fir-wood, all fallen down, the trees lying cross over one another to a man's height, and in part covered with moss, the earth being grown and raised up to these trees, though not yet so high as to touch the top: which he conceived it would do in progress of time, and so bury the trees, as it is found in Cheshire and elsewhere.

Mr. Hoskins said, that in Lincolnshire it did not dew upon these parts, where trees lay buried under ground; and that by that token such trees were found out.

Upon this occasion Mr. BRERETON was desired to make farther inquiry concerning these trees, which are found buried in Cheshire, and to observe their posture, depth, weight, figure, smell when burned, &c.

Hence

Hence some of the Society conceived, that the earth grew, and in time covered fallen trees: that turfs grew again, and filled up the cavities made in such ground by digging; that mountains grew, since there was continually so much waited of them by the rain washing away much of the earth; and that this, if not supplied by their growing, would in time very sensibly lessen them. Others thought, that several mountains, which were not rocky, were indeed by such washings lessened; and that others of them were raised, but such only as are vulcano's, that make eruptions, and by casting up new matter, raise them to a greater height.

It was also discussed, whether minerals grew; upon which Mr. BRERETON observed, that in Cheshire he had found very many different kinds of veins under ground; and that the deeper veins were nearer to ore and metal; the higher were earthy.

Sir ROBERT MORAY conceived, that, for aught we know, all minerals might have been so from the beginning; and he said, that he should be glad to see any thing so metal become metal.

Others thought, that minerals were produced by certain subterraneous juices, which passing through the veins of the earth, and having mingled therewith, do afterwards precipitate and crystallize into stones, ores and metals of various kinds and figures, according to the various kinds of salts contained in the juices and the earth.

Dr. POPE alleged the observation of Monsieur PEIRESKIUS concerning a ground in the river Rhône, which having been found by him even and somewhat soft under his feet at one time, was found hardened into oval stones some days after.

He mentioned likewise, that having evaporated some of the petrified water of Oaky-hole, no stony matter subsided.

Sir ROBERT MORAY said hereupon, that, according as the evaporation was made, stony parts subsided or not: that himself had distilled some of the Spa-water by fire, and nothing remained at the bottom: but when he evaporated of the same in the sun, there remained something; the violence of the fire carrying all away; but the gentler heat of the sun leaving gross matter behind.

Dr. CLARKE related, that in a certain field in Sussex, the stones being carried away by twenty or thirty loads once in two or three years, the place was found continually filled again with stones.

Dr. GODDARD spoke of the production of grey marble, made of cockles and other shells compacted by intercurrent stony juices; there being a continual permeation of various kinds of them through the earth, whereby the several parts thereof are strangely shifted from one place to another.

Dr.

Dr. GLISSON thought, that the petrification of wood was occasioned by the passing of stony juices into the pores of wood throughout, and by the filling them all up, and so coagulating there, without changing any thing of the figure of the wood.

Mr. HOOKE produced Dr. GODDARD's petrified wood, being cut smooth, and having a polish; which being viewed by him in a microscope in its closest part, still appeared porous. He was desir'd to cause the same stony wood to be cut sideways; and also to bring in his observations upon it.

Dr. GODDARD read his account of an experiment of a tube and quicksilver, which was ordered to be registered*, as follows:

" A tube of glass of so wide a bore, as might conveniently be stopp'd with the finger's end, and about three foot in length, was let down erect into a vessel of quicksilver, of sufficient depth to float in that posture, and so supported from inclining to any side, as left withal at liberty to perpendicular descent: then a mark was affix'd at the lower extremity of the part borne above the surface of the quicksilver: after being taken up, and the end that had been immerf'd being close stopp'd with the finger, it was fill'd with quicksilver, and then the upper end being also close stopp'd with the finger or thumb of the other hand, being carried erect, the former end was immerf'd under the surface of the quicksilver, and the finger stopp'd it taken away; and so the tube being kept close stopp'd at the upper end, was warily let down to the bottom of the vessel containing the quicksilver. After all, the tube did stick so fast to the finger or thumb stopp'd the upper end, as to be lifted thereby some inches above the mark of its immersion, and sometimes it was lifted quite out of the quicksilver in the vessel.

" And whereas it was suggest'd, that a tube of a lesser bore than those, with which the experiments were made, so ordered, would rise precisely to the mark of the immersion (the former being rais'd higher, by the advantage of the pulp of the finger forced farther into the upper end) it was found indeed much more difficult to raise it at all (the skin and grain of the finger not so closely complying and touching in all parts, when applied to a smaller bore) and though stick-ing firmly at the first raising, yet it would fall off before it could be rais'd to the mark of immersion before mentioned."

Mr. HOOKE brought in his microscopical observation of a male gnat. He was ordered to bring in writing the experiment of air exhausted out of water, and re-lap-ing into it again.

At a meeting of the COUNCIL the same day were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Dr. CLARKE. |
| Sir ROBERT MORAY. | Mr. BALLE. |
| Mr. BOYLE. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Dr. ENT. | Mr. OLDENBURG. |

* Original Register, vol. ii. p. 225.

It was ordered, that Dr. GODDARD deliver the charter of the society to Mr. ELIAS ASHMOLE, in order that the arms of the society, and the clause concerning the same, may be inrolled in the herald's office.

The committee having presented to the council the draught of the obligation to be subscribed by the fellows of the society, it was, after some alterations, agreed upon as follows :

" We, who have hereunto subscribed, do hereby promise each for himself, that
 " we will endeavour to promote the good of the Royal Society of London for improving natural knowledge; and to pursue the ends, for which the same was
 " founded : That we will be present at the meetings of the society, as often as
 " conveniently we can, especially at the anniversary elections, and upon extraordinary occasions : And that we will observe the statutes and orders of the said
 " society : Provided, that whensoever any of us shall signify to the president under
 " his hand, that he desireth to withdraw from the society, he shall be free from
 " this obligation for the future."

It was ordered, that the said committee bring in a draught of the statute for the aforesaid obligation at the next meeting of the council : And

That the next council be summoned to meet on the Wednesday following, between nine and ten in the morning, to consider of changing the time of their meeting.

Upon the reading of a letter sent out of Ireland to the secretary concerning the expectation, which the committee, that had heretofore given the society an account of Sir WILLIAM PETTY's new ship, entertained of hearing the sense of the society thereupon ; it was ordered,

That the committee should be put in mind by the secretary, that the matter of navigation being a state concern was not proper to be managed by the society : and that Sir WILLIAM PETTY, for his private satisfaction, may, when he pleases, have the sense (if he hath it not already) of particular members of the society, concerning his new invention.

June 3. The COUNCIL met again, at which were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. EVELYN. |
| president. | Mr. HENSHAW. |
| Sir ROBERT MORAY. | Dr. CLARKE. |
| Sir KENELME DIGBY. | Dr. GODDARD. |
| Sir GILBERT TALBOT. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. SLINGSBY. | Mr. OLDENBURG. |
| Mr. BALLE. | |

Sir KENELME DIGBY was sworn of the council.

VOL. I.

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15.

Dr. BATE having presented the society with ten pounds sterling by the hands of Dr. CLARKE, and desired to be continued a member of the society; it was ordered,

That Dr. CLARKE should give him the thanks of the council for his respect and kindness to the society; and that Dr. GODDARD draw up a form of this order.

Dr. BATE was elected into the society by the council.

Mr. EVELYN presented the society from Sir RICHARD BROWNE with a cushion to put their mace upon.

It was resolved, that the council meet henceforth on Wednesdays in the afternoon at two of the clock.

It was ordered, that the committee bring in a law obliging the president to be covered, except when he speaks to the whole society: as also, that they take a review of the former draughts for the making and repealing of laws, and alter them so, that the repealing as well as the making of a law be considered but twice on two several days: And

That Mr. PALMER inform himself of some lawyers, whether it be necessary to have all the by-laws of the society confirmed by the lords chief justices; and if so, whether any of such by-laws can be repealed without the revising of the said chief justices.

The committee presented the council with a draught of a statute for the obligation to be subscribed, and of another for the weekly payments: both which were recommitted.

Mr. HOOKE was elected a fellow of the society by the council, and exempted from all charges.

At a meeting of the SOCIETY on the same day, the experiment of raising water in a kind of small weather-glass, by the pressing in of air in the condensing engine, was tried; but by reason of the engine's leaking, proved imperfect, and was therefore ordered to be repeated at the next meeting*.

Mr. HOOKE was ordered to bring in writing his observations upon Dr. GODDARD's petrified wood at the next meeting: And

To observe by a microscope, whether there be any cavities in sage-leaves for little spiders to lodge in.

Sir ROBERT MORAY and Mr. HENSHAW were appointed curators of the experiment of inclosing a pebble in a glass with water, to see whether in time it will grow too big to come out of the hole, through which it was put in.

* See an account of the proceedings of this meeting in Mr. HOOKE's letter to Mr. BOYLE from London, June 5, 1663, printed in Mr. BOYLE's works, vol. v. p. 530.

Col. LONG observed, that the picking of stones from corn-ground impoverishes the land; being of opinion, that a cover of stones keeps the earth from the injuries of cold, as also from the too much exhaling of the goodness of the ground.

Dr. CLARKE mentioned, that there was a rivulet in Gloucestershire, that makes its bed in stones, and the water of which being drunk breeds the stone, the people thereabouts being much troubled with that distemper.

Col. LONG said, that once there was brought to king CHARLES I. a whole box of stones coughed out of the lungs.

Dr. CHARLETON mentioned, that stones had been found in the *plexus choroides*.

He related likewise, that one Monsieur LA VERDURE being come from Rochelle into England, after he had been seventeen days at sea, and for want of other provisions eat little else but bread and cheese, and drank a considerable quantity of brandy, found himself, upon coming on shore, very much obstructed with pains in his bowels; and having taken several glysters, voided a great many cockle-shells; a fact, as Dr. CHARLETON observed, known to many persons.

Monsieur MONCONYS* related, that a certain widow at Lyons used to void bones together with her menses every month; as parts of the jaw-bone, joints of the back-bone, &c. whereof, he said, his brother Monsieur DE LIERGUE at Lyons kept many, of which he would send some to the society.

Dr. CLARKE related, that some years since a woman in Drury-lane had brought away bones of her child out of her sides eighteen years after she had been big of that child; having had two girls between the time of that child-bearing and the voiding of the said bones. He was desir'd to bring in the complete account of that fact in writing.

Col. LONG mentioned, that a lady had brought away the bones of a child by siege two years after she had been big thereof.

Sir ROBERT MORAY related, that he had seen a man at the Spa in Germany absolutely motionless, except that he eat, drank, and spoke; but, for the rest, could stir no more than a log or stone: and that he had seen a chalky matter come out of the joints of his fingers, cheeks, &c.

Col. LONG, who was seconded by Dr. CLARKE, related, that a cornet in Scotland dissolved the stone in the kidneys, and brought it away, by chewing tobacco; which he observed to have been recommended by the duke of ALBEMARLE.

Monsieur MONCONYS mentioned, that a year ago there was a woman at Orleans in France, who died in travail, and being opened, was found to have the child

* See his *Voyage d'Angleterre*, p. 108.

placed between the matrix and the bladder; of which, he said, he could bring the attestation of the physicians of that city.

Sir ROBERT MORAY related, that Sir GEORGE HAMILTON had lighted on a certain mine in Ireland, that contained an earth yielding lead; which being washed out of that earth, and the earth laid aside, would, after some time, be impregnated again with the same metal. He affirmed the same of the saltpetre and vitriol earth about Leige. He promised to bring a fuller account thereof in writing.

He produced likewise a certain petition lately presented to the king, for a patent to practise a secret of making all grain grow plentifully in any barren ground, without laying on any dung or compost; so that the same land so sown should improve yearly, and bear corn constantly, at the charge of ten or twelve shillings an acre: as also of improving all flowers, plants, and young trees to a sudden growth, and among them vines, orange-trees, &c. and all meadows, at a very easy rate.

Mr. HENSHAW suggested, that saltpetre and cow-dung mingled in water was one of the best kinds of imbibition.

Mr. BRERETON affirmed, that he had himself seen 102 stalks upon one root of oats, supposed to have been caused by cutting the plant at the new moon.

Col. LONG mentioned, that he had known wheat, that was sown in the spring, produce a good crop; and oats sown in autumn yield very heavy oats.

Mr. PACKER related, that there was a person at Billingshurst in Suffex, who used, in flowering-time, to walk in his corn-fields, and, observing certain ears of wheat, put marks upon them, which being ripe he laid apart; and would give any man security, that such grains should never smut.

Mr. HENSHAW suggested a way of preventing the smut of corn, by passing a rope over the standing corn, and so shaking off the dew; which else, its aqueous parts being exhaled, and the clammy ones sticking to the grain, and being baked there, causeth smutting.

Col. LONG having discoursed of his opinion concerning the smut of corn, viz. that it proceeds from the root, and not the mildew, was desired to give his discourse in writing.

He mentioned, that the sowing of the corn in the husk makes it prosper better than the sowing it naked: as also, that corn threshed with flails, and thereby bruised, is the most subject to smutting.

Sir ROBERT MORAY suggested the planting of fruit with the pulp about it: to which Col. LONG answered, that it was known by experience, that excellent peaches are raised from the stone not sucked: wherein, however, he distinguished, saying, that whereas some sorts of peaches, as nectarines and musk-peaches, come

well from stones, with some pulp left about them; yet other kinds, as the Newington, or Verona peach, do not come well from the stone.

Mr. PELL related, that in the granaries of Zurich there was kept wheat in husks eighty years old.

Dr. CHARLETON was desired to give, in writing, his account of killing fishes by gagging them; and that of the ductus from the bladders of fishes to the gills.

June 10. At a meeting of the COUNCIL were present,

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|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. BALLE. |
| president. | Mr. PALMER. |
| Sir ROBERT MORAY. | Dr. GODDARD. |
| Sir PAUL NEILE. | Dr. CLARKE. |
| Mr. BRERETON. | Mr. HILL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |

Mr. BRERETON and Sir PAUL NEILE were sworn of the council.

Mr. PALMER reported, that he had consulted with some able lawyers concerning the necessity of confirming the by-laws of the society by the lords chief justices; and that they conceived such a confirmation to be unnecessary.

It was ordered, that the arrears should be collected by the following order:

Wednesday, June 10, 1663.

“ At a meeting of the council of the Royal Society.

“ Ordered, that all persons, that have been elected or admitted into the Royal Society, do pay their whole arrears unto the 24th of this instant June, according to their subscription: and that the treasurer, or collector by him appointed, do repair to every such person and demand the said arrears, shewing unto them this order, together with the form of subscription hereunto annexed.”

Signed by the president.

The form of the subscription.

“ We, whose names are under-written, do consent and agree, that we will meet together weekly, (if not hindered by necessary occasions) to consult and debate concerning the promoting of experimental learning: and that each of us will allow one shilling weekly towards the defraying of occasional charges: provided, that if any one or more of us shall think fit at any time to withdraw, he or they shall, after notice thereof given to the company at a meeting, be freed from this obligation for the future.”

It

It being found, that an order of the council of May 13, concerning the collection of arrears, had been neglected, the council made this resolution thereupon :

“ Whereas there hath been a neglect in the execution of an order of the council of May 13, concerning the collection of arrears, whereby it might have the more clearly appeared, who should be thought fit to be continued fellows of the society : and whereas the time, wherein the council hath power to elect fellows, is near expired : It is resolved, that the order of May 20, concerning the non-registering the members of the society, until they have subscribed such obligation, as the council shall agree upon, be reverſed.”

At a meeting of the SOCIETY^b on the same day, the experiment was begun to be made, to know, whether the substance of those bubbles, that are observed to float at the top of the water in two bolt-heads, after the water hath been well exhausted out of the receiver, and been re-admitted into the same, be real air, or but rarefied parts of that water. And there was put into the place of the bubble remaining in one of the bolt-heads, included in the same receiver, as much air, to see at the next meeting, whether the one as well as the other return into the pores of the water or not. The account of this experiment was registered^c, as follows :



“ There was taken a bolt-head, holding about four ounces of water : this was filled top full with water, and the mouth of the small long stem was inverted into a small glass vessel, containing water enough to cover about an inch of the stem : then both of them, in the posture here expressed in the figure, were shut up in a small long receiver, out of which when the air had been well exhausted, there were observed to rise out of the water, in the bolt-head, abundance of small bubbles, which got up to the top, and remained there in the form of air ; and as the air was farther exhausted out of the receiver, the substance of those bubbles expanded itself so far, as to drive down all the water out of the bolt-head. Then the air was readmitted into the receiver, and thereby that expanded substance was, by the reascending of the water into the bolt-head, compressed into a small bubble somewhat bigger than a large pea ; which floated at the top of the bolt head, and remained so after these vessels were taken out of the receiver : but being suffered to remain in that posture in a convenient place, after two or three days, the bubble quite vanished, and the substance returned into the form of water.

“ To know, whether the substance of this bubble was air, it will be convenient to make further trial, by including two such bolt-heads into the same receiver, and after the air hath been exhausted, and they taken out, to put into the place of the bubble remaining in one of them, as much air, and so to let them stand till the bubble in the

^b See Monf. DE MONCONY'S *Voyage d'Angleterre*, p. 147 & seq.

^c Original Register, vol. ii.

“ one or both be vanished : for if that be really air, which hath been drawn out of
 “ the pores of the water, and that it returns thither again, the common air put in
 “ the place of the extracted bubble will do the same thing : and if the air does not
 “ penetrate and descend into the water, it will be an argument, that those bubbles,
 “ that rise out of the water, upon the emptying a receiver; wherein it is included,
 “ of air, are not real air, but rarefied parts of water.

“ This experiment, according to their directions, was tried June the 10th, and
 “ the success was this, that the bubble in both the bolt-heads vanished into the
 “ water within two or three days, but that, which was drawn out of the water, re-
 “ turned first.”

The experiment of killing a mouse in the condensing engine succeeded not, because the vessel was not staunch; and it was ordered to be tried again at the next meeting; and that the engine be put into better order.

Dr. GODDARD, Mr. PELL, Dr. POPE, and Dr. CROUNE, were appointed to have the care of setting up the long glass tube for the Torricellian experiment with water.

Mr. HOOKE gave an account of his having looked upon sage-leaves with a microscope, to see whether in the cavities thereof any little spiders lurk; and he said that he had seen none.

Dr. GODDARD moved, that the trial of the growing of pebble-stones in vessels with water should be made, for more exactness sake, with a gage. Others moved, that it might be made by several persons in several waters.

Mr. LONG affirmed, that he could shew a pebble thus grown in water to double its quantity in a short time.

Monf. DE SORBIERE mentioned, that, near Paris, he had observed two stones, that had been two foot distant from one another, to be now almost grown close together.

Mr. BRERETON related, that in Cheshire there was a place, that within the last thirty years had been known to be nothing but sand, and was now a firm rock.

Dr. CLARKE said, that one of the arches of London bridge, viz. the fourth from Southwark side, had a great rock concreted to it; so that whereas the watermen had formerly esteemed that arch to be the safest to pass, they now held it to be the worst. He and Dr. CHARLETON added, that the like was to be observed on the walls by the water-side of Whitehall. And they were both, together with others, desirous to make a farther inquiry concerning these accretions.

Col. LONG mentioned, that he had observed, that earth being very curiously sifted, would not, after two years, pass through the same sieve.

Dr:

Dr. CHARLETON took notice of the accretions made to the stones under the waters at Bath; and was desired to make farther observations of them, as he had occasion.

Mr. HOOKE's observations upon Dr. GODDARD's piece of petrified wood were appointed to be read at the next meeting.

Dr. CLARKE was again desired to bring, in writing, the account given by him, June 3, of a woman, who brought away the bones of her child out of her side.

Sir ROBERT MORAY's paper concerning the mineral of Liege, yielding both brimstone and vitriol, with the way of extracting them both out of it, as used in those parts, was read, and ordered to be registered⁴.

He promised to procure a more perfect account hereof.

Col. LONG communicated his observations concerning smut in corn, with the description of it, and its difference from other vices in corn; together with his conjectures of the causes of it, and the most probable means to avoid it. His paper was ordered to be registered⁵.

It was ordered, that Mr. PACKER should be asked, who it was at Billinghamst, in Suffex, that had the skill in marking those ears of corn in flowering-time, which would not smut afterwards in two or three years.

Monf. DE SORBIERE⁶ produced a kind of cotton brought from Canada, and growing near Paris between two leaves. Col. LONG observed, that he had some of the same kind; and Mr. HILL said, that New England also afforded the like: and some other members thought, that the common thistle down resembled it very much, and was as strong and fine.

Monf. MONCONYS presented the society with two written papers of his; one containing a way of knowing exactly the difference of the weight of liquors, as he had shewed it at the preceding meeting; the other, describing the manner of ordering silk-worms in France. These papers were directed to be registered; and the former was as follows⁷:

⁴ Original Register, vol. ii. p. 229. It is published in the *Philos. Transact.* n^o 3. p. 45. May, 1665.

⁵ Original Register, vol. ii. p. 231.

⁶ He observes in his *Relation d'un Voyage en Angleterre*, p. 76. edit. Paris, 1664. that he was

introduced to the Royal Society by Sir ROBERT MORAY, who placed him next to himself, and interpreted to him, in French, whatever was said there in English.

⁷ Original Register, vol. ii. p. 236.



“ Take a glass-vial of this figure, and put into it some filings of
 “ steel, to make it near the weight of the lightest liquor known.
 “ On the top of these filings put some white wax, introducing it
 “ through the neck in small threads; and when there is enough of
 “ it to cover the filings, melt it upon hot ashes, after you have dis-
 “ posed the filings in such manner, that the center of gravity may
 “ be right upon the vial's bottom, opposite to the neck, that so the
 “ vial may always place itself perpendicularly upon the liquor and
 “ the wax: being grown cold, fix the filings in that situation.
 “ This done seal the vial hermetically; at whose bottom without
 “ there must be a little glass ring, to hang it to a little silver hook of this figure S,
 “ on which certain rings must be hung, when the liquor is so heavy, that you must
 “ put much weight upon the vial to make it sink: for if these weights, which are
 “ to be added, weigh more than the filings, and if then they should be put upon
 “ the neck of the vial, the vial would tumble over. Your engine being thus pre-
 “ pared, you must have rings of silver, whose weight doth still increase in double
 “ proportion. My rings begin with one, that weighs but the 128th part of a grain
 “ of corn; the second weigheth $\frac{1}{128}$; the third $\frac{1}{64}$; the fourth $\frac{1}{32}$; the fifth $\frac{1}{16}$; the
 “ sixth $\frac{1}{8}$; the seventh $\frac{1}{4}$, and the eighth a grain: and in remounting, there is one,
 “ that is of two penny-weights.

“ The way of making these weights, and of adjusting them is, to take for the
 “ least of them some silver thread, as finely drawn as may be, and to make a small
 “ ring of it, having a tail, by wreathing upon the end of the bodkin, and cutting
 “ the tail of what length you please, yet so that you may be able to take up the
 “ ring by the tail with silver pincers. These rings having this figure O—, you
 “ put one of the smallest you desire to have upon the vial, by passing the neck
 “ of the vial into it. Then having put other weights in the hook below, and a
 “ ring big enough of brass or latten upon it (all which together make the vial de-
 “ scend to the bottom of the liquor, into which you put it) you do file the latten-
 “ ring little by little, until you have brought the vial with all these weights into
 “ such an equilibrium with the water, that it stayeth in the middle without rising
 “ or sinking: then you take off the silver ring, and substitute another in its place,
 “ which is heavier, and consequently sinks the vial: but you pare its tail little by
 “ little, until you reduce the whole to the like equilibrium, to stay in the middle
 “ of the water without rising or sinking: then you are assured, that these two
 “ weights, or little rings of silver, weigh equally. Then you put them both to-
 “ gether upon the vial, which will sink thereupon; and to bring it again to an
 “ equilibrium, you file the latten-thread, until the vial stay in the middle of the
 “ water; and when it stayeth there, you take away the two little silver rings, and
 “ put one in their place of a greater diameter, and a longer tail, that will sink the
 “ vial; but by paring it little by little, you reduce it to the same weight with
 “ the two little ones together, when the original shall again stay in the middle of
 “ the water, without rising or sinking. And in this manner I do adjust my weights.

“ To make the comparison of the weight of liquors, you must put this vial into
 “ the liquor, and put upon it, or hang on the hook below, as much weight, as is
 “ Vol. I. L I necessary

“ necessary to make it sink; and the necessary weights will be known, when the
 “ last and the least of all maketh the difference thereof; that is, when upon the
 “ adding it to the vial that swims, the vial sinketh, and being at the bottom,
 “ doth, upon the taking away this little ring, rise again: then supputing the weight
 “ of the vial, and that of all the rings, which you have joined thereto, you say,
 “ that a volume of water, like to the volume of this vial and the rings of silver
 “ joined to it, weigh as much as this vial and the rings thereof.

“ Afterward you make the same operation in another liquor, and you see the
 “ difference, which there is, of one weight from another.

“ But if it be objected, that this operation is not just, seeing the volume is
 “ changed by adding weights; and that thereby you do not make a comparison
 “ of two like volumes of these differing liquors; the answer is, that certainly
 “ the equation is necessary, but very easy: for supposing (*e.g.*) that the vial be in
 “ a perfect equilibrium with a liquor, as the spirit of anniseed, and the vial weigh
 “ 100 grains; it follows, that a volume of the spirit of anniseed equal to the vial
 “ weigheth 100 grains: then putting the vial into a water, that weigheth much
 “ more than the said spirit, I am obliged to add to it a ring, that weigheth
 “ 24 grains.

“ 'Tis true, that a like volume of water to that of the vial and the ring
 “ weigheth 124 grains; but yet the difference of the two liquors is not of $\frac{1}{4}$, be-
 “ cause the volume of water is greater than the volume of the spirit of anniseed,
 “ by the volume of the ring, which was to be added. Wherefore, to make the
 “ two volumes equal, you take only away a volume of water like to the volume of
 “ the silver, which volume of water would weigh no more than two grains; since
 “ it is known, that the weight of silver to that of water is as 12 to 1. Wherefore
 “ taking away 2 grains from 124 (which the volume of water, like to the volume
 “ of the vial and the ring, did weigh) for the weight of a volume of water, like
 “ to the volume of the ring, there remain but 122 grains for the weight of a
 “ volume of water, equal to the volume of the vial alone; and consequently equal
 “ also to the volume of the spirit of anniseed, which was equal to the vial: and
 “ so you say, that the difference of the water to the spirit of anniseed is of $\frac{1}{4}$.

Monsieur MONCONYS promised also to describe the way of hatching chickens as
 it is used in Egypt.

Mr. HILL mentioned, that silk-worms in Virginia, and even those, which are
 transported from Europe thither, are not subject to any hurt from thunder.

Mr. PELL remarked, that as himself had observed flies produced out of dead
 silk-worm-butter-flies put into a box, so a friend of his had assured him, that such
 dead butter-flies of silk-worms had revived.

Mr.

Mr. HOSKYNs desired some leads and balls for founding without a line for one Mr. JONAS MOORE^a going to Tangier: upon which the operator was ordered to provide four leads and two balls between that and the Monday following, and to deliver them to Mr. HOSKYNs for Mr. MOORE.

Col. LONG proposed a way of advancing the manufacture of tapestry in England: which was referred to the council.

The operator was directed to give in writing what he had observed in the experiment of the sinking and floating of wheat.

June 17. At a meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. PALMER, |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. CLARKE. |
| Sir GILBERT TALBOT. | Mr. HILL. |
| Mr. SLINGESBY. | Mr. OLDENBURG. |
| Mr. EVELYN. | |

The draught of the statute for subscribing the obligation being considered again, it passed as follows:

“ Every fellow of the society, and every person elected, or to be admitted, shall subscribe the obligation in these words following:

We, who have hereunto subscribed, do hereby promise each for himself, that we will endeavour to promote the good of the Royal Society of London for improving natural knowledge; and to pursue the ends, for which the same was founded: That we will be present at the meetings of the society, as often as conveniently we can, especially at the anniversary elections, and upon extraordinary occasions; and that we will observe the statutes and orders of the said society: provided, that whenever any of us shall signify to the president under his hand, that he desireth to withdraw from the society, he shall be free from this obligat on for the future.

“ And if any fellow shall refuse to subscribe the said obligation, he shall be ejected out of the society; and if any person elected shall refuse to subscribe the same, the election of the said person shall be void: neither shall any person refusing to subscribe be admitted or registered among the fellows of the society.”

The draught concerning the making of laws passed, as follows:

“ For the making of any law or statute of the Royal Society, the draught thereof shall be read in council, and put to the vote, on two several days of their meetings: the first day the question to be resolved by vote shall be, whether the draught of the said statute, then agreed upon, shall be read at another

^a Afterwards knighted, and surveyor of the ordinance, and fellow of the Royal Society.

" meeting. The second day the question shall be, whether the draught of the said statute, then agreed upon, shall pass for a law or not."

The draught for the repealing of laws passed the first time, as follows :

" For the repealing of any law or statute, or any part thereof, the repeal shall be propounded and voted in council on two several days of their meeting. The first day the question to be resolved by vote shall be to this effect, *viz.* whether the repeal of such statute, or such part thereof, shall be propounded at another meeting. The second day the question shall be to this effect, *viz.* whether such statute, or such part thereof, shall be repealed or not. And in case the said repeal be agreed unto, the same shall be recorded in the journal-book of the council, and the statute, or part of the statute, repealed, shall be cancelled in the statute-books."

It was ordered, that the council do meet from henceforth on Mondays, about three of the clock in the afternoon.

At the meeting of the SOCIETY on the same day, in the experiment of exhausting air out of water, which returns into the pores of the water again, it was found, that the air, which at the former meeting was put into the place of the bubble, remaining in one of the bolt-heads, was relapsed into the pores of the water, as well as the bubble left in the other bolt-head. And it being suggested, that the bubbles floating in both the bolt-heads, after the drawing out of the air of the receiver, might be real air got in at the pouring in of the water, and lurking between the water and the sides of the glasses; and that such a parcel of air thus crouded in might, upon the readmission of the air, and the reascension of the water, be driven up before it to the top: for the clearing of this the operator was ordered: to make the same experiment in glasses of different bigness, to see, whether the bubbles remain in proportion to the quantity of water, or, in proportion to the surface of the glasses.

The operator was ordered to make the compressing engine very staunch; and for that end to try it often by himself, that it might be in good order against the next meeting, for the trial of some experiments with live creatures therein.

Mr. HOOKE's observations upon Dr. GODDARD's piece of petrified wood were read, and ordered to be registered¹, as follow :

" It resembled wood, in that,

" 1st, All the parts of the petrified substance seemed not at all dislocated or altered from their natural position, whilst they were wood; but the whole piece retained the exact shape of wood, having many of the conspicuous pores of wood still remaining pores, and having a manifest difference, visible enough between the grain of the wood and that of the bark; especially when any side of

¹ Original Register, vol. ii. p. 240.

“ it was cut smooth and polished, for then it appeared to have a very lovely grain,
“ like the grain of some curious close wood.

“ Next it resembled wood, in that all the smaller and (if I may so call those
“ which are only to be seen by a good glass) microscopical pores of it appear (both
“ when the substance is cut and polished transversely and parallel to those pores)
“ perfectly like the microscopical pores of several kinds of wood, retaining both
“ the shape and position of such pores.

“ It was differing from wood,

“ 1st, In weight; being to common water as $3\frac{1}{2}$ to 1: whereas there are but
“ few of our English woods, that, when dry, are found to be as heavy as water.

“ 2dly, In hardness; being very near as hard as a flint, and in some places of
“ it also resembling the grain of a flint. It would very readily cut glass; and
“ would not without difficulty, especially in some parts of it, be scratched by a black
“ hard flint. It would very readily strike fire against a steel, and also against a flint.

“ 3dly, In the closeness of it; for though all the microscopical pores of the
“ wood were very conspicuous in one position, yet by altering that position of
“ the polished surface to the light, it also was manifest, that those pores ap-
“ peared darker than the rest of the body, only because they were filled up with a
“ more dark and dusky substance, and not because they were hollow.

“ 4thly, In that it would not burn in the fire; nay, though I kept it a good
“ while red hot in the flame of a lamp, very intensely cast on it by a blast through
“ a small pipe, yet it seemed not at all to have diminished its extension; but only
“ I found it to have changed its colour, and to have put on a more dark and dusky
“ brown hue: nor could I perceive, that those parts, which seemed to have been
“ wood at first, were any thing wasted, but the parts appeared as solid and close
“ as before. It was further observable also, that as it did not consume like wood,
“ so neither did it crack and fly like a flint, or such like hard stone. Nor was it
“ long before it appeared red hot.

“ 5thly, In its dissolubleness; for putting some drops of distilled vinegar upon
“ the stone, I found it presently to yield very many bubbles, just like those which
“ may be observed in spirit of vinegar, when it corrodes coral. Though I guess,
“ many of those bubbles proceeded from the small parcels of air, which were
“ driven out of the pores of this petrified substance, by the insinuating liquid
“ menstruum.

“ 6thly, In its rigidity and friability; being not at all flexible, but brittle,
“ like a flint; inasmuch, that with a knock of a hammer I broke off a small piece
“ of it, and with the same hammer quickly beat it to a pretty fine powder upon
“ an anvil.

“ 7thly,

“ 7thly, It seemed also very differing from wood to the touch ; feeling more cold than wood usually does, and much like other close stones and minerals.

“ The reason of all which phenomena seems to be this :

“ That this petrified wood having lain in some place, where it was well soaked with petrifying water (that is, such a water, as is well impregnated with stony and earthy particles) did by degrees separate, by straining and filtration, or perhaps by precipitation, cohesion, or coagulation, abundance of stony particles from that permeating water ; which stony particles, having by means of the fluid vehicle, conveyed themselves not only into the microscopical pores, and perfectly stoped up them, but also into the pores, which may perhaps be even in that part of the wood, which through the microscope appears most solid, do thereby so augment the weight of the wood, as to make it above three times heavier than water, and perhaps six times as heavy as it was when wood. Next, they hereby so lock up and fetter the parts of the wood, that the fire cannot easily make them fly away ; but the action of the fire upon them is only able to char those parts, as it were, like as a piece of wood, if it be closed very fast up in clay, and kept a good while red-hot in the fire, will by the heat of the fire be charred and not consumed ; which may perhaps be the reason, why the petrified substance appeared of a blackish-brown colour after it had been burnt. By this intrusion of the petrified particles it also becomes hard and friable ; for the smaller pores of the wood being perfectly stuffed up with these stony particles, the particles of the wood have few or no pores, in which they can reside ; and consequently no flexion or yielding can be caused in such a substance. The remaining particles likewise of the wood among the strong particles may keep them cracking and flying as they do in a flint.”

Mr. HOOKE was desired to continue his observations by a microscope upon sage-leaves, he having at some times seen nothing like little spiders in the cavities thereof ; and at other times abundance of little eggs upon the said leaves.

The lord viscount MASSAREENE signified to the society, that it was any wood, which in a lough of his in the north of Ireland turned into stone ; and that one part was often wood, and the other stone : but he knew nothing of the story of the part turned into iron in the earth under that petrifying water. It was ordered, that his lordship should be desired by the secretary to gratify the society with such a piece, part wood, part stone ; as also to inform them, whether there be any amber found in the same lough.

Sir ROBERT MORAY was desired to give an account of the rock concreted to one of the arches of London-bridge.

Dr. CLARKE remarked, that the story of the man, who voided more stones than his own weight, was found in CASAUBON upon one of the satires of PERSIUS.

Mr.

Mr. BEALE's observations concerning the smut of corn, as also the rise of the colours of insects, were read, as they were sent in a letter of his to the secretary; and an extract was ordered to be registered^a.

Col. LONG confirmed Mr. BEALE's observations concerning the ornaments of insects by some of his own of that kind.

Monsieur DE LA QUINTINYE's letter from Paris of the 25th of June, 1663, N. S. sent to Mr. OLDENBURG, the secretary, for the society, concerning the ordering of melons, after they are knotted and appear in their fruit; as also the way of keeping the seeds well, was read; and it was ordered, that thanks be returned to him for it, and that an extract of this letter be entered¹.

Col. LONG mentioned a way of producing good melons without transplanting them; which he promised to communicate to the society.

Monsieur MONCONYS having left in Sir ROBERT MORAY's hands a description of the way used in Egypt to hatch eggs, it was ordered to be read at the next meeting.

Dr. CROUNE was desired to have the pot with the viper-powder kept by Mr. PULLEYN brought to the society, to see whether any thing alive were in it.

Mr. HOOKE's account of the wheat sinking and floating again in water, was read, and ordered to be registered^a.

June 22. The council met for the first time upon Monday, according to the order of the last meeting; and there were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker. | Dr. WILKINS. |
| Sir ROBERT MORAY. | Dr. ENT. |
| Sir PAUL NEILE. | Dr. GODDARD. |
| Sir GILBERT TALBOT. | Dr. CLAWKE. |
| Mr. AFRSKINE. | Mr. PALMER. |
| Mr. SLINGESBY. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |

The council elected into the society the earl of CRAWFORD and LINDSEY, Sir EDWARD BYSSHE, Sir JOHN BIRKENHEAD, Monsieur HUYGENS, and Monsieur DE SORBIERE.

The draught for repealing of laws passed the second time, as it stood recorded June 17, without any alteration.

The draught for the time of the ordinary meetings of the society passed the first time, as follows.

^a It does not appear in the Register.
not appear in the Register.

¹ Letter-book, vol. i. p. 85.

^a This account does

"The

" The ordinary meeting of the society shall be weekly upon Wednesday, beginning about three of the clock in the afternoon, and continuing until six; unless the major part of the fellows present shall for that time resolve to rise sooner or sit longer: and no fellow shall depart without giving notice to the president."

It was ordered, that the committee bring in a draught for a statute concerning the leave to be given to those, who shall desire to be present at the meeting of the society, both natives and foreigners, who were not fellows thereof.

Dr. WILKINS was appointed and sworn vice-president of the society.

The committee offered a law for the president being covered, *viz.*

" The president being in the chair is to be covered, notwithstanding the fellows of the society be uncovered, whilst they speak to him."

June 24. The council met again, there being present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |
| Mr. PALMER. | |

The committee for laws presented the draught of a statute for permitting those, who were not of the society, to be present at their meetings; and the members of the council present approved thereof, as follows:

" When the president taketh the chair, the rest of the fellows shall place themselves orderly and conveniently for the business of the meeting: and those persons, that are not of the society, shall withdraw, excepting, that it shall be free for any of his majesty's subjects of England, Scotland, or Ireland having the title and place of a baron, or any of his majesty's privy council of any of his three kingdoms, or for any foreigner of eminent repute, with the allowance of the president, to stay for that time: and that it shall be free for any other person, upon leave obtained of the president and fellows present, or the major part of them, to stay for that time: and the name of every person permitted to stay, of any person that moved for him, and the allowance, shall be entered in the journal-book."

It was considered, whether in the statute for subscribing the obligation, which passed once, June 17, the words, *or to be admitted*, were not superfluous; and the members present having judged them to be so, debated, whether those words should be struck out of the said statute, already passed without repealing them: or whether they, or the whole law, should be first repealed: it was thought fit to refer it to a full council.

It

It was considered also of a statute for electing noblemen, and the following was agreed upon :

" Every one of his majesty's subjects of England, Scotland, or Ireland, having the title and place of baron, or having any higher title and place; and every one of his majesty's privy council in any of the said kingdoms, upon his desire to be a fellow of the society, shall be propounded and put to the vote for election on the same day, if there be present a competent number for making elections: if otherwise, it shall be free for every such person to be present at any meeting of the society, until there be such a number present."

It was ordered, that the president take care, that there be always a blank deputation remaining with the council, in case of his or his deputy's absence.

At the meeting of the SOCIETY on the same day, Sir JUSTINIAN ISHAM was proposed a candidate by Col. LONG, and HENRY POWER, M. D. by Dr. WILKINS.

An absent member^a, who desired not to be named, presented by Mr. OLDENBURG, the secretary, a book written by him, and intitled, *Considerations touching the usefulness of experimental natural philosophy, proposed in a familiar discourse to a friend by way of invitation to the study of it*: for which thanks were ordered to the author, and the book committed to the custody of Dr. GODDARD.

Monsieur HUYGENS presented to the society from his father^b a written account of the varieties of earths found in a water-pit bored at Amsterdam in the year 1605; for which thanks were ordered to Monsieur ZUYLICHEM, who was desired to communicate a scheme of the boring engine; and the account was directed to be registered^c, as follows :

" In the year 1605, the 15th of July, a water-pit was bored at Amsterdam, in the hospital of old men, deep 232 foot (which is some 32 foot higher than the steeple of the old church there); and the ground was found as followeth :

| | | | | | | |
|----|---|-------------------------|---|---|---|---------|
| 1. | " | Stony and garden ground | — | — | — | 7 foot. |
| 2. | " | Fine | — | — | — | 9 |
| 3. | " | Soft clay | — | — | — | 9 |
| 4. | " | Sand | — | — | — | 8 |
| 5. | " | Earth | — | — | — | 4 |
| 6. | " | Clay | — | — | — | 10 |
| 7. | " | Earth | — | — | — | 4 |

51

^a Mr. ROBERT BOYLE.

^b Printed at Oxford, 1663, in 4to.

^c CONSTANTINE HUYGENS DE ZUYLICHEM. He was in England, and present at the preceding meeting of the Royal Society on the 10th of June

1663, together with his son Monsieur HUYGENS. See Mr. OLDENBURG's letter to Mr. BOYLE June 10, 1663, in Mr. BOYLE's Works, vol. i. p. 302.

^d Original Register, vol. ii. p. 243.

| | | |
|-----|--|-------------|
| 8. | " Here followeth the sand, upon which moſt part " of Amſterdam is founded | } 10 |
| 9. | " Clay | 2 |
| 10. | " White ſand | 4 |
| 11. | " Dry earth | 5 |
| 12. | " Turf bruifed | 1 |
| 13. | " Sand | 14 |
| 14. | " Sandy clay | 3 |
| 15. | " Sand and clay mingled | 5 |
| 16. | " Sand and ſea-ſhells | 4 |
| | | <hr/> |
| | 17. " After theſe 99 foot, there is a couch of clean " clay of | } 99 102 |
| | 18. " Sand, in which the boring ended | 31 |
| | | <hr/> |
| | | 232 |

Dr. POWER produced ſeveral microſcopical obſervations made by himſelf: and Dr. WILKINS, Dr. WREN, and Mr. HOOKE were appointed to join together for more obſervations of the like nature.

The pot of viper-powder, kept by Mr. PULLEYN, was opened; but nothing alive was found in it. Mr. HOOKE was deſired to look upon ſome of the powder through a microſcope, Mr. PELL relating, that Sir CHARLES CAVENDISH had kept a box of viper-powder, which being opened and found extremely ſtinking, had ſtored of little moving creatures in it, like mites of cheefe.

Sir ROBERT MORAY, Dr. WILKINS, and Dr. GODDARD were appointed to try the producing of maggots with old cheefe and ſack.

Dr. POWER related, that he had obſerved, that the little fiſhes ſwimming in vinegar diſappeared in the vinegar when frozen, but ſtriked again upon the thawing of it.

Dr. GODDARD and Mr. PELL gave an account of their thoughts about the erecting of the long glaſs-tubes for the Torricellian experiment with water. And it was ordered, that two of them ſhould be erected accordingly againſt the next meeting; and that Mr. BOYLE's engine ſhould be applied to it, to ſee, whether the water could be raiſed higher by ſuction.

Dr. CROUNE was deſired to bring in writing the relation made by him of his ſecond trial of feeding a carp in the air.

Capt. SILAS TAYLOR related, that he knew, that a carp had been fed out of the water for a twelve-month with bread moiſtened in milk in ſome damp place, by feeding it twice a day, and ſwinging it often for refrigeration. And he adviſed, that
thoſe

those carps should be taken for the experiment, which would feed; and had been accustomed to it in ponds.

Col. LONG was desired to make this experiment in the country upon such carps.

Mr. GRAUNT mentioned, that he knew a fishmonger, who in 1658 put three carps into a pond, which at the end of four years were multiplied into 875, the smallest of which were 15 or 16 inches long. He was desired to bring the story, with all its circumstances, in writing.

Col. LONG having related several remarkable facts concerning the spawning, generation, and growth of fishes, both of those that are carnivorous, and those that feed on weeds, and particularly of salmon, pikes, trouts, carps and eels, he was desired to communicate in writing these observations of his, and whatever else he knew of fishes: and in particular, whether carnivorous fishes grow sooner bigger than others: how long the male salmon are admitted, before the female ones spawn; and at what time of the year, and how often: of the ternary of trouts concerning the breeding of their kinds: of the male-salmon's taking care of and defending the spawn cast by the female in a hole; and what he had observed in other fishes relating to these circumstances. He was desired likewise to add to these his observations of toads and frogs and their spawning; and in particular of toads coupling on land unfruitfully, and of the raining of frogs, &c. of the spawning of newts and lizzards, and to shew some of the latter to the company: as also the story of the winged serpent flying to a tree, the wings of which, he said, resembled those of a bat.

Mr. GRAUNT mentioned his having been assured, that salmon of six or eight inches long were grown four feet in length in two years time. He was desired to procure the account of this with all the particulars in writing.

And all those members, who had the opportunity, were requested to make several experiments in several fishes relating to their growth.

Mr. PACKER took notice, that he had seen land-newts have fourteen eggs, which being opened had young ones in them, that ran away.

Dr. WILKINS related, that he had kept frogs for a twelvemonth in a tub drawn over with wires; and that he could never see them feed upon any thing, though he had often thrown worms into the vessel, in which they were: but that he observed them to change their colour in winter, and turn blackish, but in due season recover their natural one.

It being queried, whether sprats have spawn, Mr. HENSHAW affirmed, that he had seen some, which had spawn.

It being also queried, whether sprats were young herrings; the earl of CRAWFORD-LINSEY and Col. LONG affirmed, that they were a peculiar sort of fish, and taken in many places where herrings are not.

M m 2

July

July 1. At a meeting of the COUNCIL, were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. Wilkins. |
| president. | Dr. Goddard. |
| Sir Robert Moray. | Dr. Clarke. |
| Mr. Aerskine. | Mr. Hill. |
| Mr. Ballé. | Mr. Oldenburg. |
| Mr. Palmer. | |

The statute for the ordinary meetings of the society passed, without alteration, the second time, having passed the first time June 22.

It was voted, that the statute for subscribing the obligation, as it stands recorded June 17, with these words, *or to be admitted*, be repealed.

The same statute, excepting the words, *or to be admitted*, passed the first time, inserting these words, *or to be elected*, first, between the words *elected*, and *shall subscribe*; secondly, between the words *elected* and *shall refuse*.

It was ordered, that the council meet on the Monday following, about three of the clock, to consider of experiments proper for his majesty's reception: and that Col. Long, Dr. Christopher Wren, and Mr. Hooke, be desired to meet with them upon this occasion.

At a meeting of the SOCIETY on the same day, July 1, Alexander Frazier, M.D. was proposed a candidate by Sir Robert Moray.

Sir Justinian Isham and Dr. Power were elected, the latter of whom was likewise admitted, the former being absent.

An experiment was tried with the lungs of a frog in the pneumatic engine, to see whether they are only a *cumulus vascularum*: the success of which experiment was, that the lungs swelled much upon the exhausting of the air; but the top of one of the lobes being cut, that lobe was not seen to rise.

Monf. Huygens's experiment of purging water from air, to see whether it would subside, according to the Torricellian experiment, was made, but did not succeed; and was therefore ordered to be repeated at the next meeting.

Mr. Hooke's experiment for finding, whether the bubbles, that rise out of the water upon the emptying a receiver of the air, are real air, or only rarefied parts of water, was ordered to be repeated at the next meeting.

Monf. Le Febure's account of an operation for the volatilizing of tartar was read, and ordered to be translated into English, and registered, as follows:

Original Register, vol. ii. p. 247.

7

"PARA-

“ PARACELSUS saith, in a certain place of his works, that tartar is not to be volatilized, but in itself, with itself, and by itself. Meditating hereupon, I did mix with common rain-water equal parts of pure tartar pulverized, and of very pure salt of tartar: then I did evaporate the liquor until the matter was dry, which did remain reddish and dissoluble, not partaking any more of the acid taste of tartar, nor of the lixivial taste of the salt of tartar. And being desirous to work surely, and according to the precepts of the principal artists, I did believe, I ought to mix this reddish matter with three times its weight of distilled and calcined allum, until it seemed to be altogether insipid, to the end, as well to discontinue the parts of this salt, as also to hinder the ebullition of the matter. I distilled all in a close reverberating furnace, according to the degrees of the fire, until all the vapours ceased of themselves: but when the neck of the recipient was unluted from the retort, and I went to smell this spirit, it was found of so strong a force, and of so penetrant a sulphureous volatile smell, that no body durst approach to it, for fear of being suffocated; it intercepting the respiration, and hindering all the external senses. We did notwithstanding master it, with the loss of a part of the liquor; and taking the retort from the fire, to judge of the taste, and of the quantity of the salt, that might be left in the *caput mortuum*, I found a sublimation of (as it were) a black soot, sticking to the upper part of the neck of the retort, and reaching down into its body; which substance came off by scales, and had taken as fine and polished a black as can be seen. Afterwards I dissolved the mass, that was at the bottom in warm water, and after filtration evaporated it; but the remainder had little or no taste, though of the nature of salt, seeing it was dissoluble. Thus we may see the play of nature and art, and how the spirits and salts do act and re-act upon one another; and that from such a mixture do result things, that are besides the order of nature, and the intention of the best artists; which also doth verify what HELMOT saith, *Distillatio parit novum ens*.”

MONS. MOWCONVS's description of the way used in Egypt of hatching of chickens in ovens, was read, and ordered to be translated into English, and registered.

In this paper he remarked, that this was all the account, which he could at present recollect, and that but very confusedly; but that at his return to France he would send the society a description, written by him on the spot. He was of opinion, that the temperament of the air in Egypt contributed greatly to the success of the method of hatching chickens, since the grand duke having sent for some of the christians of Cairo, who are the only persons, that carry on that business, they had built an oven at Florence, but failed of hatching chickens.

DR. WREN was put in mind to communicate to Mr. HOOKE his method of hatching chickens by a lamp.

The operator was again enjoined to make a model of the plough for setting of corn, and to bring in a description of the uses and advantages of it.

It is bound up among the miscellaneous papers, n° 16. pref. D. D.

Mr:

Mr. Hooke gave an account, that he had looked with a microscope upon the viper-powder kept by Mr. PULLEYN, but found nothing alive. He was ordered to continue his observations upon sage-leaves.

The operator was directed to provide hazel-sticks against the next meeting, to make again the experiment of the *virgula divina*.

Dr. WILKINS mentioned, that Dr. CROUNE had, in the blood of a dog dissected by him, found abundance of little insects. Mr. Hooke was desired to take notice thereof, and to make frequent observations with a microscope on the blood of several animals.

Mr. HOSKYNs related an experiment of the production of bees out of dead bullocks, described by Mr. HARTLIB out of an extract of Mr. CARY, in his *Commercium lib. of Bees*¹. This was directed to be tried in a warm place, but in the shade.

Dr. GODDARD moved, that a whole animal slayed should be tried, and put up in a jar-glass, and covered, to see what insects would be produced from it.

The earl of CRAWFORD-LINDSEY suggested a way of producing maggots by horse-dung and the blood of an ox covered over with bran and earth. His lordship promised to make the experiment, and to communicate the success of it to the society.

Mr. BRERETON related, that at Lambeth, under the boards of an hogsty, were once found a bushel and half of snakes.

Capt. TAYLOR related, that a gosling being killed and covered from the air with a turf, was found, a fortnight after, to have produced many maggots; three of which, being kept a month, were increased to the bigness of a man's thumb. Col. LONG suspected, that they might be bred by the ground itself.

Sir ROBERT MORAY presented the following account of the measure of the giant-child born in Scotland, being two and twenty months old².

| | | | | | | |
|---|---|---|---|---|------------------|------------|
| " The checkle bone | - | - | - | - | 8 $\frac{1}{2}$ | } inches." |
| " The greatnes of the arm about the elbow | - | - | - | - | 10 $\frac{1}{2}$ | |
| " The greatnes of the leg | - | - | - | - | 11 $\frac{1}{2}$ | |
| " The greatnes of his neck | - | - | - | - | 15 $\frac{1}{2}$ | |
| " The breadth of the shoulders | - | - | - | - | 16 $\frac{1}{2}$ | |
| " The greatnes of the thigh | - | - | - | - | 19 | |
| " The greatnes of the head | - | - | - | - | 20 $\frac{1}{2}$ | |
| " The greatnes of his waste above | - | - | - | - | 29 $\frac{1}{2}$ | |
| " His greatnes below | - | - | - | - | 31 $\frac{1}{2}$ | } |
| " His height | - | - | - | - | 37 $\frac{1}{2}$ | |

¹ Printed at London, 1653, in 4to.

² Original Register, vol. ii. p. 249.

Sir ROBERT MORAY communicated likewise an account of a very large herring, caught upon the coast of Scotland, which, according to that account*, contained in length 19½ inches, and in breadth, without the fins, 5 inches.

Monday, July 6. At a meeting of the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Mr. NEILE. | Dr. CLARKE. |
| Mr. AERSKINE. | Mr. PALMER. |
| Mr. SLINGESBY. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |
| Mr. EVELYN. | |

There met with them, according to the order of the preceding meeting, Col. LONG, Dr. CHRISTOPHER WREN, and Mr. HOOKE.

The king's entertainment being taken into consideration (for which the meeting of the council on this day was appointed) it was ordered,

That Mr. HOOKE and the operator take care so to prepare the compressing engine, that it might not fail in the trying of experiments therein: And

That the operator take care to have the long tubes set up against the Monday following.

Col. LONG promised to bring in his apparatus of insects, some snakes eggs, his collection of curious stones, among which were some with natural screws; some crinoids and lizards, natives of England; as also some exotic beasts skins.

Dr. CHRISTOPHER WREN promised to think upon some experiments proper for the purpose, and to send them from Oxford to the president. He mentioned the turning glass thermometer with an index, left with Dr. GODDARD.

Dr. WILKINS undertook the experiment of raising a great weight with a man's breath; and that of the metallic tree, both with mercury, after Dr. POWER's way, red and green; and to engage Dr. POWER to make that magnetical experiment here, which he had made in the country, according to his written account sent to Dr. CROUNE for the society, viz. of altering the polarity of a heated and cooled iron, by repercutting the two ends, and of destroying all the magnetism thereof, by striking such an iron in the middle.

Dr. GODDARD promised to shew, 1. the way of raising a considerable weight by the shrinking of gut strings moistened. 2. The way of raising a great weight with

* Original Register, vol. ii. p. 249.

† Mr. HOOKE, in a letter to Mr. BOYLE, dated on Friday, [July 2.] from Pall-mall, printed in Mr. BOYLE's works, vol. v. p. 533, observes,

that there was very little done at this meeting of the society, the whole day being not much above an hour.

a little water. 3. The way of sucking up a good quantity of water, by drawing the air of the vessel into the chest.

Dr. CLARKE promised to shew, that a frog will live above twenty minutes after his heart hath been taken out, and ceased to move.

Dr. ENT was to be desired by Dr. WILKINS or Dr. GODDARD to prepare the dissection of an oyster and lobster.

Mr. HOOKE was charged to shew his microscopical observations in a handsome book to be provided by him for that purpose: to weigh the air, both in the engine and abroad: to break empty glass balls; as also to let the water ascend into them after they have been emptied: to provide the instrument for finding the different pressure of the atmosphere in the same place, as likewise the hygroscope made of the beard of a wild oat.

It was ordered, that Mr. SLINGESBY give directions for the engraving of the society's arms upon their mace.

It was resolved the second time, that the statute for subscribing the obligation, as it stands recorded June 17, with these words, *or so be admitted*, be repealed.

The same statute, except these words, *or so be admitted*, passed the second time, inserting these words, *or so be elected*, twice; first, between the words *elected* and *shall subscribe*: secondly, between the words *elected* and *shall refuse*. See the minutes of June 17, and July 1.

July 8. Dr. CHARLETON presented the society with the plan of the stone antiquity at Avebury, near Marlborough, in Wiltshire; suggesting, that it was worth the while to dig there under a certain triangular stone, where he conceived would be found a monument of some Danish king. Col. LONG and Mr. AUBREY were desired to make farther inquiry into it.

Sir PAUL NEILE's discourse of cider was read, and ordered to be registered^r.

Col. LONG was desired to peruse all the papers hitherto given in concerning cider, and to reduce them into one compleat history, adding his own observations and experience on that subject. Capt. TAYLOR was also desired to communicate what he knew of it in writing.

Mr. WALLER suggested, that verjuice being an excellent sauce, the vines yielding it might be planted more plentifully in England. Col. LONG mentioned, that he had planted of them himself, and that they will grow well every where in these parts.

^r Original Register, vol. ii. p. 251.

Sir ROBERT MORAY presented an account, sent from the East-Indies, concerning the temper of the coast of Coromandel, and the way of cooling their liquors in those parts, by expoling them to the heat of the sun.

It was ordered to be registered *, and was as follows :

" Upon the coast of Coromandel, 16 degrees northern latitude, between Paleacote and Mefulepatam, 50 leagues in length, yearly, from the 6th of June untill mid-August, certain hot winds blow from the land-ward, beginning at eight in the morning, and continue until four in the afternoon, with such suffocating heat, that man is not able to endure it without extraordinary helps and refreshments ; as with keeping in close and dark rooms, and in fitting up to the neck in fats of stone, made for the nonce, and filled with cold water. The thing here worthest of observation is, that each man, every day, for his provision of drink, hangs his pitcher or bottle, made of our common pot-earth, filled with well-water, or other portable liquor of several sorts, upon some post, tree, or wall, or other conveniency at hand (higher or lower as it falls out) in places where the sun and wind are most piercing, where it continues from eight till four in the afternoon, in all the scorching heat : and then taken in, as usually they do, the drink more pleasant and cool, than any depth of cellarage with us can make it.

" At that time, cool winds come from the sea-side, and continue all night till eight in the morning, to the refreshment of all creatures. But if the bottles be suffered to continue in the air, as before, during the cool sea-gales, the liquor grows hot and unfit to drink.

" The author of this report is a person of credit, and hath lived many years in the place ; and saith, that the inhabitants, nor yet any of the strangers trading there, as English, Portugals, Hollanders, Persians, Turks, Armenians, Mogols, and others, understand not the reasons of these effects : at the least, that in his time, he never met with any able to give him any probable reason for it ; nor is it known, that any of the adjacent places are affected with the like accident."

Col. LONG produced some of the stone matter concreted to an arch of London-bridge, being like an hardened sandy clay.

Mr. HOOKE brought in three microscopical observations, 1. Of the edge of a razor : 2. Of a piece of fine taffata-ribband : 3. Of one of the millepedes.

He was ordered to give, in writing, the two experiments lately made concerning the bubbles remaining on the top of the water in glass balls, upon the emptying of the receiver ; and the not subsiding of the water freed from air.

The operator was ordered to get the long glass tubes raised against the next meeting.

* Ibid. p. 249.

Dr. FRASIER was elected into the society.

July 13. At a meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. PALMER. |
| president. | Mr. WILKINS. |
| Sir PAUL NEILE. | Dr. GODDARD. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |

It was ordered, that every person admitted by the council into the society, who had not formerly paid his admission-money, do pay the same, being the sum of forty shillings: And

That every person elected a fellow of the society shall pay, or cause to be paid, his admission-money within one month after the said election.

The statute for weekly payments passed the first time, as follows:

“ Every fellow of the society shall pay one shilling by the week towards the charges of experiments and other expences of the society, so long as he shall continue a fellow thereof: which continuance shall be accounted from the time of his admission until such time as he shall signify to the president under his hand, that he desireth to withdraw from the society; or until, upon any other account, he shall cease to be a fellow thereof: and if any fellow shall refuse to pay according to the rate aforesaid, he shall be ejected out of the society, except the said payment be remitted in whole or in part, by special order of the council.”

It was enacted the first time, that in the statute for making laws already passed, between the words *shall be*, and *whether*, shall be inserted in both places of the statutes these words, *to this effect, videlicet*.

It was resolved, that in one of the two scutcheons of the society's mace be engraven the whole arms of the said society, and in the other the following inscription:

*Ex Munificentia
Augustissimi Monarchæ
CAROLI II.*

D. G.

Magnæ Britannię, Francię, & Hibern. Regis, &c.

Et

*Societatis Regalis Londini ad Scientiam
Naturalem promovendam institutę Fundatoris
et Patroni*

Anno 1663.

July 16. Mr. Hooke brought in an account in writing of two experiments tried by the society, one concerning the uniting and mixing of air and water; the

other concerning the suspension of defecated water in a bolt head after the receiver had been well exhausted. This account was ordered to be registered*, and was as follows :



" A bolt-head, of the shape of A, containing about six or seven ounces of water, with a neck about six inches long, was filled top-full with water, and the mouth of it inserted into a small glass body of water as B, and so conveyed into the receiver of the evacuating engine, and kept there till the receiver had been very well exhausted. Then it was taken out, and the little bubble of air, that was found in the bolt-head, and had been drawn out of the water, was removed, and as much of the common air put in its place, and then suffered to stand in the posture represented in the figure. By this, at the same time, was set just such another bolt-head and body, and was filled with common water, out of which the air had not been exhausted; only a bubble of common air, about the bigness of that which was put into the other bolt-head, was left at the top. These being observed afforded these phenomena; the bubble of air in the first was observed to be vanished into the water within a day or two; but the bubble in the latter was found not much diminished about a week after."

" A bolt-head and body, just like the former, was, upon Monday July the 16th, set into the receiver, out of which the air was presently drawn; and the bubbles did rise very copiously out of the water into the bolt-head, and beat down all the water out of it, below the surface of the water in the body. These things were suffered to remain in this posture till July the 8th, the receiver being kept all the while well exhausted, by often repeated pumpings: then it was taken out, and the bolt-head was filled top-full with this exhausted water inverted into the body, and again included in the receiver. After the receiver was pretty well exhausted, there arose a small bubble out of the neck of the bolt-head, which getting to the top, and as the pumping was continued, expanding itself, did beat down all the water out of the bolt-head as before. Then the bolt head was again taken out of the receiver, filled top-full with the exhausted water inverted into the body, and closed into the receiver as before: out of which though the air was pretty well exhausted by pumping about half a quarter of an hour, yet the water was observed to remain suspended in the bolt-head, and not at all to descend."

The operator was ordered to provide against the next meeting a tube of five or six feet long, to repeat the latter of these two experiments.

Mr. PELL produced a bag containing potter's sand, which he had been formerly desired to procure upon a discourse about the advancing the English potter's art, that it might equal at least that of Germany, if not the old Roman bakers of sepulchral urns: which then gave occasion to speak of our English materials, and our

* Original Register, vol. ii. p. 244, 245.

varieties of earths, clays, and sand. Upon which Mr. PELL related, that in *Suffex*, about twenty-seven years, he had seen a bricklayer make a new oven, wherein he observed an unusual bottom, which the workman had promised to make without gaps and chinks, as of one stone, and therefore better than if he should use bricks, or any set of paving tiles. To which end, having brought a sufficient quantity of sand (which, as Mr. PELL remembered, looked blackish, as if it had been dirty) he strewed it upon the rough bottom of the oven, and then for want of a flat hammer, took an iron wedge, made to cleave wood withal, and with the flat end of it knocked the sand, and beat it close into a smooth floor; which being done, and the oven finished, he, after the usual manner, put the wood into it, and annealed it. After the oven was cold, the bottom of it seemed solid and firm, and such as he had undertaken to make it. Nor did Mr. PELL remember, that he saw any flaw in it a year after, though it had been used for baking perhaps every week.

Upon this occasion some of the members suggesting, that this sand might be capable of more noble uses than for ovens, and that it might perhaps be found useful for vitrification, or at least some untransparent fusion, Mr. PELL had been desired to cause some of that sand to be brought to the society, which now came accompanied with a letter of one Mr. NICHOLAS GILDREDGE of East-Bourne, dated June 29, 1663, giving this farther information, that the son of the bricklayer mentioned above, named CARPENTER, had told him, that the way to use it was to beat it long with hammers, till it becomes so firm and compact, that it may be pared smooth with the tools; and that then the great heat of the fire will harden it into a stone. But the writer of the letter added, that his usual mason, one ROSOM, had told him, that he never saw any oven well made with it; but that he saw CARPENTER's father make one at Crowlinck, which seemed, when in paste, and after paring, to be very like to do well; and, as he thought, ROSOM said also, that after nealing too, it looked firm; yet the first or second time it was used it mouldered all up again, and he was obliged to bottom the oven again with bricks. The writer of this letter offered to send the whole quantity of this sand, which he had in his house, viz. near a gallon, if it should be desired. Mr. PELL and Dr. GODDARD were desired to examine this sand, and to make some trials of it.

Sir ROBERT MORAY produced the two stones found in the earl of BELCARRES's heart, of which he had given a description in writing April 15, 1663.

Dr. CLARKE gave in writing his former relation of a woman, who had carried her child eighteen years in her belly, and then excluded the bones of it, after an extraordinary manner, by an abscess in the side of her belly. This relation was ordered to be registered*, as follows:

"In the year 165—, hearing, by common report, of a woman living in Drum-alley, in Drury lane, that had carried a child eighteen years in her belly, and
 "now excluded the bones of it after an extraordinary manner, by an abscess in the
 "side of her belly, my curiosity, among others, carried me to see her. I found

* Original Register, vol. ii. p. 270.

" her

" her a woman of seven or eight and forty years, tall, strongly made, and appearing
 " to have been of a good habit of body. She had been now some years a widow,
 " getting her own and a daughter's livelihood, whom she had, of about eleven
 " years of age, by hard labour; going abroad to washing and scouring, or such
 " kind of work, until within some few weeks past, when she had lived by the cha-
 " rity of those, whose curiosity brought them to see her.

" I saw she had two or three holes from an abscess in the left side of her *abdomen*,
 " near the place where the incision for a paracentesis is usually made, out of which
 " came matter and some bones, which had been the vertebrae of a child; I saw di-
 " vers others she then had in a box, being several of the bones of a skull, the
 " shoulder blades, ribs, vertebrae, bones of the limbs, which had all been excluded
 " from those holes of the abscess, and were the bones of a perfectly formed child;
 " of which she every day yet excluded more. I had from herself the following story.

" That about eighteen years before, having after, as she thought, gone her full
 " time with child, she endured two or three days of strong pain, without any hopes
 " of being delivered; when one of the women, to give her ease, with a large
 " towel compassing the bottom of her belly, lifted it up, standing behind her;
 " upon which she felt some part, as she thought, break within her, and something
 " remove from the bottom of her belly into her side. From this time she felt no more
 " pain, and by degrees, as she thought, grew well; the swelling of her belly some-
 " thing diminishing, though continuing always considerably swelled in the left side.

" After two years, or thereabouts, she conceived, and in due time brought forth
 " a female child, which lived about two or three years; but after four years more,
 " or thereabout, she brought forth another female child, which was the daughter
 " I then saw with her. She enjoyed her health well, until some few months before
 " I saw her, when having a great pain on that part of her belly, which continued
 " swelled, she received from some one an ointment, upon use of which her belly
 " being all inflamed, she after used poultices to the swelled part; which breaking,
 " and a great deal of matter running out, after some weeks the found bones offer
 " themselves to come out of the orifices; and from that time, every day for the
 " most part, took out some, until I think she had all the bones of a perfectly
 " formed child."

Sir ROBERT MORAY produced a French letter, giving an account of a safe and
 easy way of cutting for the stone in the bladder, practised by a Frenchman, named
 RAUX, in France. The letter was ordered to be translated into English by the
 secretary, and then registered*, as follows:

" Monsieur RAUX, a famous lithotomist, native of Languedoc, having given
 " very many proofs of his great capacity in cutting the stone of the bladder, as
 " well in his own country as in many other places, is lately arrived in the city of
 " Paris, where he hath already cut some persons with admirable dexterity, and a
 " most prosperous success, after this extraordinary manner.

* Original Register, vol. ii. p. 272.

" First,

“ First, without any other preparations but of some glysters, the night next preceding the operation, he maketh the patient to urinate, and then foundeth him with his *digiti index*, which he introduceth into the *anus*; and having found the stone, he maketh the patient take two or three turns in the chamber. Then, having placed him upon the knees of a man sitting upon a joint-stool, who holdeth him about the waste, two others holding his legs asunder, the patient himself holding and drawing a little his *scrotum*, the master introduceth again the same finger of the left hand into the fundament, joining sometimes to it his middle finger, according as there is need; wherewith he conveyeth and sustaineth the stone in the neck of the bladder, thrusting it towards the left side as much as he can, near to the interior part of the *os pubis*; where holding it firm, by putting to it the thumb of the same hand, he performeth his operation with his right upon the stone, longways, of a bigness suitable to the bigness of the stone, cutting first the teguments, then making the incision upon the neck of the bladder, a little less long than that of the said teguments; which incision he maketh afterwards a little bigger with his finger: but he quitteth not the instrument, which is small enough, and crooked towards the point, cutting on both sides, before he hath been heard to rake the stone with the said instrument; and then presently he thrusteth out the stone with the same finger, which he keepeth still in the fundament, assisted by the thumb without, and by the hands of those, that hold the legs, making them compress the whole *peritonæum*, and the interior part of the *hypogastrium*: or else he draweth it forth with the thumb and the fore finger of his right hand; with which finger he searcheth in the bladder all what is to be drawn out.

“ If the stone adhere to the bottom of the bladder, he thence disengageth it by little and little with the same finger, having brought the bottom to the neck, and then he draweth it forth in the same manner. After which the patient must for a little while be held upright, at which time he maketh him go some paces, to void the blood that may be shed within those parts; and afterward he causeth the patient to lie down, applying only upon the wound of the teguments some flour with the white of an egg, the wound of the bladder being retired a finger's square, drawing towards the *scrotum*; either because the bladder withdraws itself, having been by force conveyed into the place of the operation; or because the teguments, that hath been drawn towards that side, do relax after the operation. Which being done, he wrappeth the patient from the waste downwards in a linen-cloth, having made a bandage light enough; and the next morning he putteth on an astringent plaister, and leaveth nothing but a little bandage to hold it on.

“ It is to be observed, that all those, whom he hath cut after this manner, have been perfectly cured without any accident, and among others without urining through the incision, and without any fever. He also causeth the patient to observe no other diet, than such as is used by sober persons in health: and ordinarily they rise the fourth or fifth day, and may go abroad the twentieth or two and twentieth day.”

Sir

Sir ANTHONY MORGAN related, that the like way of cutting for the stone was known and used in Ireland; of which he promised to procure a fuller information, and to communicate it to the society.

Dr. CHARLETON undertook to repeat at the next meeting his dissection of carps, to shew better what formerly he had suggested about the duct of the bladder to the gills. And the operator was directed to provide three or four carps of a middle size for that purpose against the next meeting.

Dr. CROUNE being asked concerning the little insects, which at the meeting of July 1, 1663, were by another member said to be by him observed in the blood of a dissected dog, said, that he had only found them upon the dissecting-knife a fortnight after it had been put up.

Sir ROBERT MORAY presented the society from prince RUPERT with a certain water-raising engine*, which was ordered to be tried.

Sir ROBERT MORAY was desired to procure a fuller information concerning the way used on the coast of Coromandel for the cooling of drinks by exposing them in bottles to the scorching heat of the sun all day long; which he promised to do.

Mr. HOOKE produced three microscopical observations, 1. Of fine lawn. 2. Of a very smooth and even gilt edge of fine Venice-paper. 3. Of a *tinea argentea*.

Sir ROBERT MORAY read out of a letter from Sir WILLIAM PETTY to himself some performances of his new ship, as to swiftness, keeping a wind, staying and steering, not stopping, &c. and he was desired to give an extract of that letter.

Sir ANTHONY MORGAN mentioned something about the custom of salmons returning into the same place of fresh water for spawning, of which he promised to give a farther account in writing.

Sir ROBERT MORAY mentioned, that near Chertsey in Surrey a spring was discovered, on the water of which was found floating a certain oleaginous substance; some of which he was desired to procure for the company.

The Torricellian experiment was made with water in a glass-cane about 40 foot long; and the water being fallen first to about 33 foot and within 18 minutes to about 32 foot, the operator was ordered to let it subside till all the air be got out, and then to observe the height, at which the water stands; and then to fill the pipe up to the top with water freed from air.

Monsieur DE BEAUFORT VABRES was proposed candidate by Sir ROBERT MORAY, and being a person of quality, and a foreigner, ready to go away, was at the same meeting elected and admitted a fellow of the society.

* Mr. HOOKE, in a letter to Mr. BOYLE written this day, and published in Mr. BOYLE's works, vol. v. p. 532. observes, that such an engine is taken notice of in SCHOTTUS's Mechanics, "whose contrivance is continually to raise water by turning round a cylinder with a sliding board in it, included in another hollow cylinder or barrel." Sir

Sir EDWARD HARLEY was proposed candidate by Sir ROBERT HARLEY in a letter, and signified to the society by the lord viscount Brouncker, president.

HENRY FORD, esq; was proposed candidate by Col. LONG.

July 20. At a meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Mr. BRERETON. | Mr. OLDENBURG. |
| Mr. BALLE. | |

But there not being a *quorum* for the passing of statutes, it was deferred till the next meeting.

July 22. At a meeting of the society Sir EDWARD HARLEY and Mr. FORD were elected and admitted.

Sir JOHN TALBOT was proposed candidate by the lord viscount Brouncker, and EDWARD WATERHOUSE, esq; by Dr. WILKINS.

Capt. TAYLOR gave in his observations on cider, which were read, and ordered to be registered*.

Mr. WINTHROP's letter written from Boston to Mr. OLDENBURG was read, giving an account of the trials made by him at sea with the instrument for sounding of depths without a line, and with the vessel for drawing water from the bottom of the sea; both which proved successless, the former by reason of too much wind at the time of making soundings; the latter, on account of the leaking of the vessel. Capt. TAYLOR being to go soon to Virginia, and offering himself to make the same experiments, the society recommended to him the trying of the one in calm weather, and of the other with a stanch vessel.

Mr. HOOKE mentioning, that a better way might be suggested to make the experiment above-mentioned, was desired to think farther upon it, and to bring in an account thereof at the next meeting.

Sir ROBERT MORAY produced some of the water of the spring discovered two miles from Chertsey, and gave this farther account of it, that it is clear, but covered almost all over with a thick oleaginous matter, which had neither taste nor smell, while it lay upon the water, of a colour very near as red and a consistence thicker than warm blood, as long as the sun is high; but about the sun's rising and setting, of various colours; flowing so copiously, that it might be had in great quantities in a very short time. Being for some hours exposed to the heat of the sun, it contracted a putrid smell, and some of the floating red matter precipitated to the bottom.

* Original Register, vol. ii. p. 274.

Mr.

Mr. HOOKE was ordered to take a journey to Chertsey, at the charge of the society, and to observe the said spring, and to inform himself of all circumstances concerning it, and also to distil some of it.

Mr. BRERETON made mention of certain waters in Cheshire, some of which are yellow, esteemed to betoken coal-mines; and others red, held to be a sign of iron-mines.

Capt. TAYLOR mentioned a spring in Shropshire at Pitchford, on which floated a bituminous substance, which being taken off one day, the like will be found on it again the next.

Dr. CLARKE related, that the Barnet waters, on a hot sun shiny day, were found full of little insects; which insects, the water being strained, remaining upon the cloth, turn into a jelly. He and Mr. HOOKE were desired to go to Barnet for a more particular account of this matter.

Dr. GODDARD gave an account of the trials made of the sand produced at the last meeting by Mr. PELL, viz. that having made a separation by washing, some of it looked black, some crystalline, and two coppels being made of it, one of them, that was heated only red-hot, kept its standing; but the other, being urged by a more intense heat, vitrified, and melted into a lump. Mr. PELL was desired to send for more of this sand, his friend having offered him the rest of what he had thereof in his house.

Some of the society rubbing a piece of the vitrified lump of this sand, found it electrical.

Dr. CLARKE being called upon for his trials of the injections into veins, promised to give them in a fortnight after.

Sir ROBERT MORAY mentioned, that the king had made an experiment of keeping a sturgeon in fresh water in St. James's Park for a whole year: it was moved to kill it, and to see how it would eat.

He related, that prince RUPERT had made a new kind of gunpowder, in strength so far exceeding the best English powder, that trial being made with a powder-trier, it was found to be in the proportion of 21 to 2. It was desired, that a trial of it might be made before the society; and that the account of the way of making it, formerly communicated, might be looked after, and registered, which was done, as follows:

“ The three ingredients of gunpowder, viz. saltpetre, brimstone, and coal, must be prepared each by itself; as followeth:

Original Register, vol. ii. p. 283.

VOL. I.

O O

“ Take

" Take of common saltpetre about fifty pounds, more or less, according as you
 " intend to make more or less powder; and put it into a very clean and well rubbed
 " copper-kettle, that is even every where, to the end that the saltpetre, after it is
 " purified and hardened again, may be brought whole out of the kettle. Then
 " pour upon this petre very clean limpid fountain-water, so that it may stand two
 " inches above it; and put it upon a trivet over a fire made of dry small wood
 " till it melt; and when you see the upper part melted, thrust a clean stick to the
 " bottom of the kettle, to know whether it be all melted or no. When it is
 " thoroughly melted, then let it boil up a matter of ten times, scumming away all
 " the dirt with a clean copper-scummer. After this put either the saltpetre from
 " the trivet into a cool place, or put the fire that is under it quickly away (the first
 " way is the better) and cover the kettle with some boards, and a double linen-
 " cloth very well, and so let it stand twenty-four hours, or so long till the saltpetre
 " shoot into crystals. Then put the kettle upon a bench, and inclining it, let
 " the water by little and little run off from the petre into another vessel, till nothing
 " thereof be left in it; letting the kettle stand in this posture half a day, till all
 " the water be quite dropt away from the petre. Then putting the kettle right
 " again, take the crystallized petre, as much as you can get loose with your hands,
 " and put it into a very clean wooden trough, and then turn the kettle upside
 " down upon a table covered with a clean cloth, and shake it till all the petre fall
 " out; and with a great sharp knife scrape well away all the dirty sediment from
 " the bottom. Then beat off the petre the upper part, as far as to a hand's height
 " from its bottom, into pieces, and put them with the gathered crystals upon a
 " dry clean table, and with a wooden mallet beat all this pretty small, and then
 " expose it to the sun, or put it in a stove in winter, stirring it sometimes till the
 " saltpetre grow altogether dry again. Then take again a copper-kettle, but not
 " altogether so big as the former, yet very strong, it being to endure a great heat;
 " somewhat narrower toward the bottom than at the top, that the saltpetre may
 " the easier be gotten out of it. This kettle being put over a good smith-coal fire,
 " fill it brimfull of the purified saltpetre, and let it melt, and stir it with a stick
 " to the bottom as before: this melting, till it be complete, will require a great
 " deal of time and exercise of patience. And though the said stick, by the stir-
 " ring at the bottom and every where in the kettle, should take fire, it were no
 " matter, and you need not fear; but rather, if the fire decay, put under more
 " coals, until the saltpetre be melted into a clear liquor, which, though it look
 " black at top, yet is within pure and clean.

" Then take small beaten brimstone sifted through a hair-sieve, and with your
 " two fore fingers scatter it very thin every where on the surface of the melted salt-
 " petre; and this will, by a flame, consume all the impurity that is there, repeating
 " it some three times quickly one after another. The saltpetre being thus made
 " thoroughly pure and quick, put away the fire from under it, or, as afore, remove
 " it from the fire into a cool place, covering it well, until it grow cold and hard.
 " Then turn the vessel upside down upon a clean table, that the saltpetre may fall
 " out of it; and not falling at the first knock, you must knock it several times,
 " and it will come out like a tallow-cake, which must be scraped clean at the bot-
 " tom: then with an iron-hammer beat the saltpetre into some great pieces, and
 " put

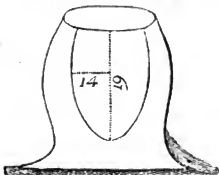
“ put these into a great mortar, and pound them as small as flour, and sift it through a clean hair-sieve, which hath two leather bottoms, that nothing may fly away in dust. The grosser parts, that will not pass through the sieve, must be beaten till they all pass, and then keep all in a trough apart; which is the preparation of saltpetre for gunpowder.

“ The second ingredient is brimstone, which you must choose fine and yellow, and very pure; which, if pressed close within the hollow of your hand, and put to the ear, will make a cracking noise, and thereby discover its goodness. This must be beaten in a mortar (like as the saltpetre was) into a flour, and sifted also through such a sieve, and kept likewise in a vessel apart.

“ The third ingredient is coal; which to make, you must look in bushes and hedges for a kind of wood called *spina cervina*, which hath black berries and a grey rind, and leaves not unlike common cherry-leaves; much used by coopers for taps, having within, when cloven, a red star. These you must cut off at the bottom, choosing such as are strait without knots, and of an inch in thickness, not much bigger, for fine powder. It is better than any other wood whatsoever for this purpose, and it yields a dry and clear-sounding coal, which keepeth the powder very dry and good, and from growing soft or mealy, or dusty by the weather; and maketh it catch fire very easily. Having a good quantity of this wood, cut away knots, tops and twigs; peel away all the outward and the green rind from the top to the bottom, and scrape it all over till you see it white every where, and then bind them together into faggots, exposing them to the sun or air to dry very well; which they will do better, if loosened again after they are carried abroad; then cut them with a small hatchet into pieces of about a foot and a half long, and cleave them in the middle, and that piece, which is too thick, cleave again, that they may be all of the same size, and burn out all together into coals; for if one be thicker than the other, the thicker will burn out slower than the other; and before it turn to coal, the thinner may be half turned to ashes. You will do well to put this wood cross-wise, round about in a chimney or hearth, two or three foot high, one above another; and have a care lest your hearth be broken, that no earth and stones may mingle under the coals. Then kindle the wood, and when it begins to coal, throw the ends of it into the fire also, that all may be burned together. All being turned to coals, turn them every where with a stick, to see whether none of them do smother, which must be quickly burned thoroughly, or cast away. Then put these coals into a new great earthen vessel, ready at hand, and cover them immediately with a wooden or iron cover, and they will go out presently: thus you may burn as much as you need. These coals put into a scarer that hath holes of the size that a pea may fall through, and sift away the dust and ashes, and look very carefully, that there be no dirt or filth among them, which throw away. Then beat them in a convenient mortar to powder as fine as flour, and sift them through the narrow hair-sieve, and keep them also by themselves, as the rest,

“ Follows the dose, how much of each ingredient must be taken into the composition.

“ For this purpose you must have ready a very just balance, with two pretty big copper scales, and a pile of weights; and then see how big your stamping mortar is, if you mean to work your powder with your hands; or the wooden trough of a powder-mill, wherein it is to be pounded; for accordingly you may order your dose, that so you may not do too much nor too little; and that the powder may be wrought enough, *e. g.* If the trough of the powder-mill have about nineteen inches in depth, and fourteen inches in the midst, where it is largest (for to be of a right shape and proportion, as it ought, it must be oval, after the manner in the figure) the powder falling from the top, whither it went



“ up by all the sides, handsomely down again into the midst under the pestles, it will be well wrought. And these being well made, and wholly cast of materials for brass-guns, are the best; though I have used to two powder-mills such as were cast of iron, which were good (being neatly cast). If the trough, I say, be of this bigness, then you may very well weigh together a dose of about seven pounds and an half, putting in one of the scales six pounds of saltpetre, and twelve ounces of brimstone, and fifteen ounces of coals; so that I reckon to each pound of saltpetre two ounces of brimstone, and two ounces and an half of coals. After this pour such a dose into a great trough, and with your hands mingle it together gently; having first spread it thin all over the bottom of the vessel, or upon a table: and then with a clean black brush, dipt into very pure and clear water, sprinkle it; yet not too much at first, for fear of making it too moist; and work it well with your hands, till it somewhat yield to rolling; the more you work it the better it will be, sprinkling it now and then with water, till it be wrought enough, and neither too dry nor too moist. Then put the dose into your mortar or mill-trough, and let it be pounded two hours; and then take it out with a flat copper-shovel, and put it into the trough: and there remaining sometimes at the bottom a part of the dose as hard almost as a stone, you must with a fit brass instrument labour to work it out; and having crumbled it into as small pieces as may be, mingle it very well with the rest; and if it be so dry as to dust in the pounding, you are to moisten it as afore.

“ This working or pounding must be continued for sixteen or seventeen hours; yet so as to take out the dose every two hours. This time being passed, save half an hour, take out the dose once more, and moisten it for *corning*, but somewhat more than afore, to the end that being put in again to be pounded half an hour longer, it may handsomely stick together in little lumps of the bigness of a pea or bean, or somewhat bigger, so that it may not dust; yet be careful, that you moisten it not too much, but observe a medium as much as is possible.

“ After this you take out all for corning, and having ready a corning-table so made, that you may draw it downwards before, having in its middle two wooden staves

“ staves overthwart, upon which the corning-sieves may go to and fro, you must
 “ also have ready four searers, the first with holes about the bigness of a pea,
 “ and the other three with such as are still lesser than the other; so that the last
 “ may just fit the size of the powder desired. Then pour one half part of the
 “ dose into the biggest of these sieves, put upon the staves of the corning-table,
 “ moving it forward, backward, and round; and what will not pass, you must
 “ gently press with your flat hand. and having thus made the little lumps lesser,
 “ sift them again. And if any of it yet remain, that is so hard and big as not to
 “ pass, use a wooden trencher, of a small inch thickness in the midst, with a
 “ wooden peg in it of a finger's length, and therewith break it by pressing on it,
 “ whilst you shake the sieve up and down. With the other half part proceed in
 “ the same manner. All being passed through the wide sieve, put your vessel
 “ upon the ground under the corning-table, and draw the table downward, to let
 “ the sifted powder run into the vessel, sweeping with a brush into it what will not
 “ run down. Then dress your table right again, and with the other three lesser
 “ sieves, according as they gradually differ in their holes, sift the powder over and
 “ over again, as afore; and if you sift it twice in the narrow sieve, it will be the
 “ better. After all this take a hair-sieve, and sift in it your powder in three parcels,
 “ to the end that the dust may fall upon the table; and what remains in the
 “ sieve pour upon a dry table, and expose it to the sun, or in a warm stove to dry.

“ It will fall out sometimes, that the moist powder in the sifting will stick with-
 “ in the sieve-holes; which when it does, take a little twig, and with it beat on the
 “ bottom of the sieve (after you have first put the other powder on one side) and
 “ then it will pass through. Have also a care not to touch your powder with un-
 “ clean hands, because it weakens it.

“ The powder being altogether dry, put it again in two parcels into a hair-sieve,
 “ and sift the dust out of it upon the table, and add it unto the other dust sifted
 “ out afore, and moisten this again for corning, as hath been taught above, letting
 “ it first be stamped about an hour in the mortar or mill-trough, and then being
 “ corned, after the manner already mentioned, you have prepared your powder as
 “ it ought to be.

“ Because this powder is pretty strong, you must make your charges somewhat
 “ less in all small guns, and especially in pistols, for else they will break.

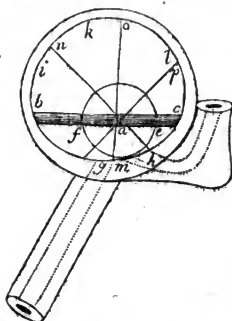
“ F. M. Z. B.”

Mr. BRERETON mentioned, that he had been informed at the Tower about four or five years since, that there was then there some of the gunpowder of 1588 much better than any now made. He added, that he knew not whether the way of making, or the care of keeping it, caused the difference.

Prince RUPERT's water-raising engine after the method of CAVALIERIUS's *hydroconisterium novum*, was ordered to be tried; and a description of it was given in by Mr. HOOKE, which was ordered to be registered*, as follows:

* Original Register, vol. ii. p. 281.

“ It



" It consists of three parts.

1. " A hollow cylinder *i, k, l, b, g*, which cavity is not perfectly round; but of such a figure, that all the diameters drawn through the point *a* (which is out of the middle) are equal.

2. " Of a solid smaller cylinder, *e, f, d*, perfectly round, which is so placed with the hollow of the former, that one side of it doth always touch the concave cylinder in the point *m*.

3. " Of a sliding valve or board, *b, a, c*; which being equal to the diameter of the figure, always toucheth opposite sides of the concave cylinder; and as the smaller cylinder is moved round within the hollow one, the valve is made to slip to and fro in a groove or mortise made fit for

" it, through the middle of the smaller cylinder; both ends of which cylinder passing through adapted holes in the ends of the smaller cylinder, have handles fastened to them, by which the cylinder is turned about from *f*, by *d*, to *e*; by which means the end of the valve *b*, is moved by *n, a, l, e, &c.* By this circumstance of the cylinder and valve, the water is always drawn in by the hole *g*, which is behind the valve; and cast out by the hole *b*, which is before it."

Dr. CHARLETON undertook to cut out the spleen of a dog at the next meeting; as also to send for a dog out of the country, whose spleen had been cut out about four or five years before, in order to open him again, and to observe the present constitution of those parts.

The operator was ordered to provide a young dog against the next meeting.

Dr. CHARLETON was desired to bring, in writing, his account of the observations of the dissection of the carps, made by him at this meeting.

The operator was ordered to prosecute the experiment of Monf. HUYGENS in the longer glass canes; as also the Torricellian experiment in the tube of 40 foot.

June 27. At a meeting of the COUNCIL were present,

The lord viscount Brouncker,

president.

Sir ROBERT MORAY.

Mr. BRERETON.

Mr. AERSKINE.

Mr. HENSHAW.

Mr. BALLE.

Dr. WILKINS.

Dr. GODDARD.

Mr. PALMER.

Mr. HILL.

Mr. OLDENBURG.

The

The president, at the desire of the council, charged himself with the survey of the treasurer's accounts.

It was voted the second time, that in the statute for making laws, between the words *shall be* and *whether*, be inserted, in both places, these words, *to this effect, videlicet*.

The statute for weekly payments passed the second time, as it stands recorded July 13, 1663.

The 2d, 3d, 4th, and 5th statutes of the 4th chapter, concerning the ordinary meetings of the society; and the 1st, 2d, 3d, 4th, 5th, 6th, and 7th statutes of the 6th chapter, concerning the election and admission of fellows, passed the first time.

July 29. At a meeting of the SOCIETY, Sir JOHN TALBOT and Mr. WATERHOUSE were elected.

Mr. HOOKE produced several figures, both for sounding-instruments without a line, and for vessels to fetch up water from the bottom of the sea. He was desired to give an explanation of these figures in writing; and the operator was ordered to make two models against the next meeting, one of the sounding instrument, and another of the water-drawing vessel, each after the draught of the first figure of each kind.

The operator gave an account of the observations made of the Torricellian experiment in the long tube, and particularly of its rising and falling according to the weather; and he was ordered to continue his observations, and to put them all in writing.

He was directed also to exhaust the air out of the tube for making of Monf. HUYGENS's experiment at the next meeting.

Mr. HOOKE was ordered to apply Mr. BOYLE's engine to the long tube for the Torricellian experiment, to see whether the air could be thence exhausted; and whether, thereupon, the water would subside at all.

Mr. GRAUNT read two letters from Sir WILLIAM PETTY, concerning the success of his new ship in its sailing to Holyhead; and was desired to give an extract of those letters to be registered.

Dr. CLARKE produced two cocoan-nuts, which seemed to be outwardly petrified.

Mr. HOOKE was put in mind of going to see the spring near Chertsey; as also, of assisting Dr. CHARLETON, in drawing a scheme of the carp or salmon, which he was to dissect, in order to shew the duct from the bladder to the gills of the fish.

Dr. ENT, upon mention made concerning the insects found in Barnet-waters, suggested, that they are found there only in August.

Dr. CHARLETON cut the spleen out of a dog of about a year old, the dog surviving; upon which occasion it was related, that FIORAVANTI, the Italian writer, in one of his Italian books, says, that the same had been practised successfully upon a lady much troubled with splenetic distempers; she outliving the loss of her spleen many years.

The following were ordered for the next meeting.

1. The continuation of the Torricellian experiment in the long tube.
2. That of Monsr. HUYGENS, to keep the water suspended after the exsuction of all the air.
3. Some experiment or other in the compressing engine.

The day following, *July 30*, Dr. WREN wrote from Oxford a letter to the president, concerning the experiments proper for his majesty's reception^a.

“ MY LORD,

“ The act and noise of Oxford being over, I retired to myself as speedily as I could, to obey your lordship, and contribute something to the collection of experiments designed by the society for his majesty's reception. I concluded on something I thought most suitable for such an occasion; but the stupidity of our artists here makes the apparatus so tedious, that I foresee I shall not be able to bring it to any thing e'er I am necessitated to take a journey, which I am unavoidably tied to. What in the mean time to suggest to your lordship I cannot guess. The solemnity of the occasion, and my solicitude for the honour of the society, make me think nothing proper, nothing remarkable enough. It is not every year will produce such a master experiment as the Torricellian, and so fruitful as that is of new experiments; and therefore the society hath deservedly spent much time upon that and its offspring. And if you have any notable experiment, that may appear to open new light into the principles of philosophy, nothing would better become the pretensions of the society; though possibly such would be too jejune for this purpose, in which there ought to be something of pomp. On the other side, to produce knacks only, and things to raise wonder, such as KIRCHER, SCHOTTUS, and even jugglers abound with, will scarce become the gravity of the occasion. It must therefore be something between both, luciferous in philosophy, and yet whose use and advantage is obvious without a lecture; and besides, that may surprize with some unexpected effect, and be commenable for the ingenuity of the contrivance. Half a dozen of experiments thus qualified will be abundantly enough for an hour's entertainment; and I cannot believe the society can want them, if they look back into their own

^a Letter-book, vol. i. p. 97.

“ *Stor*

"store. For myself, I must profess freely, I have not any thing by me suitable
 "to the idea I have of what ought to be performed upon this occasion. Geometrical problems and new lines, new methods (how useful soever) will be but
 "tasteless in a transient shew. New theories, or observations, or astronomical instruments (either for observation or facilitation of the calculi) are valuable to
 "such artists only, who have particularly experimented the defects, that these things
 "pretend to supply. Sciographical knacks (of which an hundred sorts may be
 "given) are so easy in the invention, that now they are cheap. Scenographical, catoptrical, and dioptrical tricks require excellent painting, as well as geometrical truth in the profile, or else they deceive not. Designs of engines for
 "ease of labour, or promoting any thing in agriculture, or the mechanic trades,
 "I have occasionally thought upon divers, but they are not intelligible without
 "letters and references, and often not without demonstration. Designs in architecture are only considerable as they are appropriated to some work in hand,
 "or else, as they are a kind of criticism and search into antiquity. In navigation,
 "it will be presumptuous to proffer at any thing, while we expect from your lordship an accurate theory, from the times of Noah unknown, and reserved for your
 "lordship, a second great endeavour of human nature. The needle had possibly
 "more of chance than invention; yet that gave us a new world. This will be
 "the product of reason and philosophy, and may give us the undiscovered parts
 "of our globe. In the few chemical experiments I have been acquainted with,
 "I cannot tell whether there will be any, that will not prove too dirty or tedious
 "for an entertainment. Experiments of anatomy, though of the most value for
 "their use, are fordid and noisome to all, but those whose desire of knowledge
 "persuadeth them to digest them. Experiments for the establishment of natural
 "philosophy are seldom pompous. It is upon billiards and tennis-balls, upon
 "the purling of sticks and tops, upon a vial of water, or a wedge of glass, that
 "the great DES CARTES hath built the most refined accurate theories, that human
 "wit ever reached to; and certainly nature, in the best of her works, is apparent
 "enough by obvious things, were they but curiously observed. The key, that
 "opens treasures is often plain and rusty; but unless it be gilt, the key alone will
 "make no shew at court.

"If I have been conversant in philosophical things, it hath been principally in
 "these ways, which I have recounted to your lordship, by which your lordship
 "perceiveth how useless I am for this occasion. Yet if your lordship will still
 "pursue me, I know not what shift to make, but to retire back to something I
 "have formerly produced or discoursed of.

"I have pleased myself not a little with the play of the weather-wheel (the only
 "true way to measure expansions of the air) and I fancy it must needs give others
 "satisfaction, if it were once firmly made, which I suppose may be done, if the
 "circular pipe, which cannot truly be blown in glass, were made of brass, by
 "those, who make trumpets and sackbuts (who wire-draw their pipes through a
 "hole and equal them, and then filling them with melted lead, turn them round
 "into what flexures they please) but the inside of the pipe must be varnished with
 "china-varnish (which GRATERIX hath) to preserve it from the quicksilver, and
 "VOL. I. P p "the

“ the glasses must be fixed to the pipe with varnish, which I take to be the best
 “ cement in the world ; for thus the Chinese fix glass and mother of pearl in their
 “ work. It would be no unpleasing spectacle, to see a man live without new air
 “ as long as you please. A description for cooling and percolating the air at
 “ once I formerly shewed the society, and left with Mr. BOYLE : I suppose it
 “ worth putting in practice. You will at least learn thus much from it, that
 “ something else in air is requisite for life, than that it should be cool only, and
 “ free from the fuliginous vapours and moisture it was infected with in expiration ;
 “ for all these will, in probability, be separated in the circulation of the breath in
 “ the engine. If nitrous fumes be found requisite (as I suspect) ways may per-
 “ haps be found to supply that too, by placing some benign chemical spirits, that
 “ by fuming may impregnate the air within the vessel. If an artificial eye were
 “ truly and dioptrically made (which I would have at least three inches diameter)
 “ it would represent the picture as nature points it. The cornea and crystalline
 “ must be glass, the other humours water. I once surveyed an horse's eye as exactly
 “ as I could, measuring what the diameters of the several spheres of the humours
 “ were, and what the proportions of the distances of the centers of every spherical
 “ superficies was upon the axis of the eye. The ways, by which I did it, are too
 “ long to rehearse ; but the projection in triple the magnitude Sir PAUL NEILE
 “ may possibly find out : or, if your lordship think it worth while, I shall reiterate
 “ the experiment.

“ A needle, that would play in a coach, will be as needful to know the coast and
 “ way joined with the way-wifer) as a pleasant diversion to the traveller ; and
 “ would be an acceptable present to his majesty, who might thus, as it were,
 “ sail by land. The fabric of it may be such as this : in a sphere of glass of
 “ two inches diameter, half full of water, cause a short broad heavy needle to
 “ swim, being buoyed up by the chart, and both varnished. Instead of a cap and
 “ a pin, let the perforated needle play about a small wire or horse-hair, extend-
 “ ed like a perpendicular axis in the glass sphere ; which being made weighty
 “ with lead, fixed to the nadir, and an horizon as it were cemented to it, let it
 “ play in circles, like the vulgar compass. Then let an hemispherical concave box,
 “ containing the sphere in its circle, be hung upon springs after this manner : sup-
 “ pose a basis, upon which are erected perpendicularly three stiff wooden springs
 “ of yew ; from the ends of which springs are strings or nerves strained, forming
 “ an equilateral triangle, the middle of whose sides pass through three small loops
 “ on the brim of the concave, which therefore hanging on the lutestrings, repre-
 “ sents a circle inscribed in a triangle : from the middle of the basis ariseth a
 “ worm-spring, fastened by a spring to the nadir of the concave, drawing it down
 “ a little, and acting against the other three springs. Thus I suppose the springs
 “ will take off much of the lateral and perpendicular concussions ; the circles will
 “ take off oscillations ; the agitations remaining will be spent in the water, and
 “ stilled by the chart covering the superficies of the water ; for thus we see, a
 “ trencher swimming in a bucket keeps the water from spilling in the carriage.
 “ And the Chinese, instead of circles, have their compasses swimming in water.
 “ Lastly, I would have all the bottom of the basis, near the edge, made like a
 “ brush, but with soft, thick, and inclining bristles, which will ease it like a thou-
 “ sand

" sand springs. It should be placed on the middle of the floor of the coach, where
 " by opening a window, you may likewise see the way-wifer placed on the perch.

" My Lord, if my first design had been perfect, I had not troubled your lordship
 " with so much scribble, but with something performed and done; but being taken
 " off by my occasions, I had rather be impertinent than disobedient, and am fain
 " in this letter to do like the common chemist, who, when projection (his fugi-
 " tive darling) hath left him thread-bare, is fain to fall to vulgar preparations to
 " pay his debts. And I must needs acknowledge, I am not only indebted to the
 " society, but most part to your lordship, to whom I owe a double duty, both as to
 " our president, and to my very good lord and patron."

August 3. At the meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. BALLE. |
| president. | Dr. WILKINS. |
| Mr. BRERETON. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. OLDENBURG. |

The president acquainted the council, that Sir GILBERT TALBOT¹ had sent to him, without taking any fees, the mace bestowed by his majesty upon the society; and that himself, the president, had in the book of his majesty's jewel-house acknowledged the receipt thereof for the society. Whereupon it was ordered, that Sir GILBERT TALBOT should have the thanks of the society, which the president was desired to give him: And

It was resolved, that the clerk and the operator be mace-bearers *pro tempore*.

It was ordered, that the lord viscount Brouncker, Dr. WILKINS, Dr. GODDARD, Mr. PALMER, Mr. HILL, and Mr. OLDENBURG, meet on the Monday following, about two of the clock, in Dr. GODDARD's chamber², to examine the accounts of the treasurer.

The 2d, 3d, 4th, and 5th statutes of the 4th chapter, and the 1st, 2d, 3d, 4th, 5th, 6th, and 7th statutes of the 6th chapter be passed the second time.

August 5. At the meeting of the SOCIETY Mr. WATERHOUSE was admitted; and the lord ASHLEY was proposed by the lord viscount Brouncker, and elected the same day, according to the privilege of noblemen.

Sir GILBERT TALBOT received the thanks of the society for sending them the mace, which his majesty had given them, without taking any fees.

Dr. FAIRCLOUGH was, at the motion of Dr. GODDARD, permitted to be present at this meeting, and shewed a certain stone (pretended to be an oriental bezoar) of

¹ Master of the jewel-office.

² In Gresham College.

the weight of twenty ounces and an half ; but being rubbed upon fair white paper (according to Dr. GLISSON's suggestion) left no greenness upon it. He was desired to produce this stone again at the next meeting, that it might be looked upon with a microscope, which Mr. HOOKE was ordered to bring with him for that purpose.

Mr. HOOKE produced three microscopical observations, 1. Of the honey-comb-sea-weed. 2. Of the teeth of a snail. 3. Of rose-leaves, having, at the season of the year, when they are withering, a certain plant growing on the back of them.

Sir ROBERT MORAY produced again the stones taken out of the earl of BELCARRES's heart, and desired, that the figure of them might be drawn ; and Dr. WILKINS moved, that it might be taken in plaister : the care of both which was committed to Mr. HOOKE.

This gave occasion of speaking concerning the stone in the kidneys ; upon which Dr. WILKINS moved, that trial might be made upon a dog, whether the stones of the kidneys might be cut out with any success ; and Sir ROBERT MORAY suggested, that this experiment deserved to be tried the rather, because old dogs are said to die commonly of that distemper ; and that himself had found a very old dog, being dissected, full of gravel in the kidneys. Though this operation was thought very difficult by Dr. GLISSON, Dr. GODDARD, Dr. QUATREMAINE, and Dr. CHARLETON, by reason of the situation of the kidneys lying so deep in the body, and of the great effusion of blood consequent upon the opening, and of the danger in wounding the ureter ; it being also very uncertain to hit the side, on which the stone lies : yet notwithstanding these difficulties, Dr. CHARLETON was desired to try this experiment at the next meeting upon a dog, which the operator was directed to provide for that purpose, in order at least to see, whether a wound in the kidneys be curable.

Sir ROBERT MORAY related, that more trials had been made of prince RUPERT's gunpowder, which he formerly mentioned to have above ten times the force of other powder. These trials, he said, had been, that whereas thirty grains of this powder raised a weight to a great height, half that quantity, with a little ferrel put loose in the powder-trier, raised the same weight to a greater height than the whole did : but this moiety with the ferrel fixed in the same trier did not raise it so high as the whole would do.

Mr. HOOKE was appointed to consider of a way to determine the strength of powder by weight.

Dr. WILKINS was desired to give directions for the lifting up of fifty pounds weight by one grain of *aurum fulminans*.

Sir ROBERT MORAY was desired to get two hollow iron-balls made for the putting of gunpowder into one, and *aurum fulminans* into the other ; and to make them

them red-hot, in order to see, whether the gunpowder would melt in one, and the *aerum fulminans* fire in the other.

He and Mr. BOYLE affirmed, that the *aerum fulminans* being fired might be recovered.

August 10. This council-day nothing was done for want of company.

August 12. The president and his deputy¹ being absent this day, there was no meeting of the society.

August 17. At the meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. HENSHAW. |
| president. | Mr. BALLE. |
| Mr. BRERETON. | Dr. WILKINS. |
| Mr. BOYLE. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. SLINGESBY. | Mr. OLDENBURG. |

Mr. PALMER was desired to inquire of some lawyers, whether more at a time than one vice-president of the society could be sworn.

The 1st, 3d, 4th, and 5th statutes of the 3d chapter, and the 1st, 2d, 3d, and 4th statutes of the 8th chapter passed the first time.

It was ordered, that a statute should be made, that the president should not preside in any council or committee transacting any business, wherein he is a party.

Mr. ASHMOLE presented the society with a picture of their arms.

August 19. Sir JOHN PETTUS, RALPH BATHURST, M. D. and Mr. JOHN BEAL were elected; and Dr. BATHURST being present was admitted.

Capt. SILAS TAYLOR presented the society with his *History of gavelkind* lately printed²; for which he received their thanks, and the book was recommended to Dr. GODDARD's custody.

Mr. WATERHOUSE presented the society with a manuscript attested by a public notary of Amsterdam, containing the relation of an accidental bezoar of an extraordinary size, weighing near seven pounds, and having been formerly tried at Amsterdam (where a certain citizen was possessor of it) by several physicians, apothecaries, and druggists of the said city, to be a true natural bezoar. This paper was ordered to be filed up.

¹ Dr. WILKINS. ² At London 1663, in 4to.

Dr. ENT suggesting, that a true natural bezoar put into water would have the same weight, when weighed afterwards, with what it had before; the oriental bezoar produced by Dr. FAIRCLOUGH, of twenty ounces and an half, was weighed, and then dipt in water, and found to weigh afterwards three quarters of a grain less than before.

Mr. GRAUNT brought in his account of the multiplication and growth of carps and falmons; which was ordered to be registered*, as follows:

“ A pond new digged at Deptford for horses and other cattle to water in the year 1658, two male and two female carps being then put in, with intention to breed; in the year 1662 the pond being tainted with fish, so that the cattle refused to drink, there were then taken out of this pond eight hundred seventy and odd carps, of about nine inches in length, some more, some less; a great number of smaller fish being left for breeders.

“ And in the Severne and elsewhere it hath been experimented, by fastening of small pieces of fine tape or silk through the gills of young falmon, that in two years they have advanced to near three foot in length.”

Dr. CLARKE was desired to bring in his experiments of injection, as they were then; and to make an addition hereafter of those, which he should try farther.

Mr. HOOKE gave in a picture of the stones taken out of the heart of the earl of BALCARRES*.

The lord viscount BOUNCKER promised to get the same done in plaister.

Mr. HOOKE produced his microscopical observation of a long-legged spider, having two eyes fixed on its back, and standing out upon a stem.

The operator produced some rain-water with a great number of little insects in it. Mr. HOOKE was ordered to look upon them with a microscope, and to draw the picture of them. The operator was directed to keep these insects, in order to see, whether they would turn into any other kind; and likewise to procure and keep some Barnet-water, which breeds worms, chiefly in August.

Mr. HENSHAW related, upon this occasion, that having kept once some dew in a glais, he found worms breed in it; and leaving it in his study shut close for some weeks, whilst he was in the country, found at his return the study swarming with gnats, which he thought to have been produced by these worms; and that he was confirmed in this opinion, by finding the surface of the water full of little skins or bags; from which he conceived that the gnats had crept out, since himself saw one of them creep out and fly away.

* Original Register, vol. ii. p. 289.

* Ibid. p. 290.

The experiments were tried of closing up some gunpowder and some *aurum fulminans* into two several iron-balls, and of putting them in the fire; whereof that with the gundpowder fired and burst; but that with the gold-powder not at all; but being cut asunder, the powder thereof was found sticking to the sides within, and with *aqua regis* reduced to gold; of both which Dr. GODDARD was desired to bring a full account in writing.

It was agreed to desire Sir ROBERT MORAY to procure stronger balls to be made of this kind, to promote the experiment; and that the balls should be made of one solid piece thicker than the former, with a hole drilled into each of them, and the male screw very exactly fitted to the female-screw.

Mr. HOOKE shewed the figure of an engine for determining the force of powder by weight; and was desired to draw it again, and to add some explication to it.

The lord viscount BOUNCKER was desired to consider of the powder-trials made by prince RUPERT, wherein eleven grains of powder put into a trier with a loose ferrel, raised a weight higher than as much more doth with a ferrel fixed.

Dr. WILKINS was desired to provide against the next meeting things necessary for the lifting up of fifty pounds weight with one grain of *aurum fulminans*.

Monsieur HUYGENS's experiment was tried again, and succeeded; the water, which was well purged of air, remaining fastened in a cane of near seven foot, after the engine was very well exhausted.

It was ordered to be tried again, and Mr. HOOKE was desired to continue the application of a sucker to it; and to take an exact notice of all the circumstances occurring in this experiment, and to give all in writing.

August 24. At the COUNCIL were present

Mr. BOYLE.

Mr. PALMER.

Mr. BALLE.

Mr. HILL.

Dr. WILKINS.

Mr. OLDENBURG.

Dr. GODDARD.

The treasurer's accounts were begun to be examined, both as to the payments made by the fellows to him, and the bills of payments made by him for the use of the society.

Mr. BALLE offered the following experiments for his majesty's reception:

1. Of the two marbles.
2. Of making a consistent substance of spirit of wine and another liquor.
3. Of making two liquors smoke by approach.

4. Of

4. Of turning a greenish opake liquor partly into a transparent red, and partly into a whitish substance, by the affusions of a clear liquor.
5. Of sinking a substance in a glass by pouring in more water.
6. Of the ascension of water upon suction.

August 26. At a meeting of the SOCIETY a Latin letter of Dr. ECCARD LEICHER, of Erfurt in Germany, to the society, dated the 16th of April 1663⁹, relating to a printed book of his sent by him to his majesty, concerning the design of reducing all sciences, and divinity itself, into order by an apodictical method, and desiring the opinion of the society in this matter, was read, and referred to the consideration of Dr. WILKINS, Dr. WALLIS, Mr. PELL, and Mr. HOOKE, to make a report thereof to the council, and to draw up something by way of answer to it.

Dr. GODDARD brought in writing an account of the two experiments made at the last meeting with gunpowder and *aurum fulminans* in iron-balls; which was read, and ordered to be registered¹. He was desired to prepare more *aurum fulminans* for the prosecution of these experiments.

Mr. COLWALL gave in an account which he had received in a letter from the governor of St. Helena, dated there April 30, 1663, concerning the tides, winds, springs, spouts, and weather there; which account was ordered to be registered², and was as follows:

“ The tides here, which are at full and change about two of the clock, rise not above four foot and an half: they seem to come on both sides of the island to us, in Chapel-valley, which respects only north and west, which is always to leeward, the wind blowing constantly all the year about east-south-east. The tides never come so high as our river, which indeed is but a small brook, that a man may step over, by reason of the high beach near the sea. The springs are all aloft, and flow almost every way from the middle, which is the highest part of the island, in little, narrow, and deep rills and guts; and so disperse themselves to most quarters of the island. But no spring-head, nor any wood, within two miles of the sea round. We have for the first three years had some scarcity of rain; but the last year, so much as hath done extreme damage, not only to our fruits above (for there is no good grounds below) but endangered all our fortifications: the fort called Greenwich was one half borne down with the floods; and the castle much in danger. I cannot call them spouts, that we have had, yet I may say they were cataracts. The rains have continued, though now moderate, above fifteen months; and yet we can hardly see three fair days together: but neither thunder, lightning, frost, snow, extreme heat or cold, but of an equal temperature all the year.”

⁹ Letter-book, vol. i. p. 89.
vol. ii. p. 291.

¹ It does not appear in the Register.

² Original Register,

Mr,

Mr. COLWALL mentioned, that Mr. THOROWGOOD, a master of a ship, who had received instructions from the society for the East-Indies, was returned, and had some account to give of what he had done for the society in his voyage; which he was desired to bring in at the next meeting.

Dr. GODDARD produced some of the Barnet waters of two years old in a large glass-vessel, which being cracked in one place, some salt was found on the outside of the glass about the crack; which salt put upon a coal melted, and was looked upon as of a peculiar kind.

Mr. HOOKE was ordered to make observations both upon the insects of the rain-water and the Barnet water; to draw schemes of them; and to see whether they will change into other kinds, and to what bigness they will grow.

He produced his explications of the new sounding instrument, and of the vessel, that fetched water from the bottom of the sea; and of the engine for determining the force of gunpowder by weight. He was directed to draw the figures in great against the next meeting, for the better satisfaction of the members.

He produced a scheme of the pleiades, as he had lately observed them mingled with other stars; among which he had discovered ten kinds of magnitude below the fifth. He represented in this scheme above eighty stars, whereas GASSENDUS hath set down but thirty-five near the said pleiades. He was desired to continue these observations, and particularly to make some of the sheath of Orion, the triangular star, &c.

It being related by Mr. OLDENBURG the secretary, that he had been desired in a letter written by Monsieur LUDOLF, counsellor of the duke of Saxe-Gotha, to procure from the society for a domestic of that prince, who was to be sent into Egypt and Ethiopia, some instructions of inquiries fit to be made in those parts; and that it would be a great satisfaction to the said prince to be gratified therein, the society desired Mr. BOYLE, Mr. HENSHAW, and other members, who had opportunity, to draw up some queries for that purpose: and Mr. HENSHAW having been already desired to think upon this matter, gave in a paper of his containing inquiries for Egypt, which was read, and ordered to be registered*, as follows:

1. " Whether it rain there at any time, at what time of the year? whether rain make the air wholefome or pestilential, or otherwise unhealthful?
2. " To consider the nitre, that is commonly sold there, and what affinity there is between that and our common saltpetre; to try by dissolving it in warm water, filtering it well, then boiling almost half away, and putting the remainder in an earthen pan, set in a cool place for two days, to see, if it will shoot into crystals of petre. To send two or three hundred weight of it into Europe. To inquire of the manner how nitre is made.

* Original Register, vol. ii. p. 292.

3. " Whether it be true that the Arabs can charm the crocodile ? or whether there be on the Nile side any talismans or constellated figures beyond which the crocodile cannot pass.

4. " To inquire particularly into the manner of hatching eggs in Egypt ; how the camel's dung is prepared wherein they are laid ; how often the eggs are turned ; how covered : whether they hatch in one and twenty days, as they do with us under a hen ; whether the chickens are as perfect as ours ? if imperfect, whether that may not happen to them by rough handling, while they are removed (being very tender) out of the place where they are hatched ? to take the designs of the manner how, by the pipes, the heat is conveyed into several rooms ? how they treat them betwixt the time of their hatching and taking away by the owners ? whether they do not also hatch eggs under hens ?

5. " To inquire at Cairo for several other drugs, which are common there, and much in use ; yet are not brought into Europe ? as acacia, calamus odoratus, amomum, costus, ben album, and divers others such like.

6. " To take an account of the wooden locks there, which are said to be made with as great art, as those of iron with us.

7. " To inquire whether the great quantity of yellow amber, which is to be sold at Cairo, be, by reason that amber is the gum of a certain tree growing in Egypt or Ethiopia, as BELLONIUS after DIODORUS SICULUS affirms : and that besides several animals, that are often found inclosed in that amber, there is very frequently some part of the bark of a tree found sticking to it.

8. " To inquire of a certain tree growing in Arabia, not far from Cairo, which bears a fruit stuffed with wool, that is finer than silk ; of which the Arabs make linen, that is softer than silk, and whiter than cotton.

9. " Whether the female palm-tree be not fruitful, unless she grow by the male ?

10. " Whether children born there in the eighth month do usually live ? contrary to what happens in other countries.

11. " Whether crocodiles, that are found to be sometimes thirty foot in length, are hatched from an egg no bigger than a turkey's ?

12. " Whether the ichneumon or Egyptian water-rat, can kill a crocodile, by skipping into his mouth, and gnawing his way out ; as old writers affirm ?

13. " To inquire whether the appearance of the legs and arms of men appearing out of the ground, to a very great number, at a place five miles from the city of Cairo, on Good-Friday, do still continue ? and how that imposture is performed ?

14. " To

14. " To inquire whether the earth of Egypt, adjoyning to the river, preserved
 " and weighed daily, keeps the same weight till the 17th of June; and then grows
 " daily heavier, with the increase of the river.

15. " Whether, tho' the plague be never so great before, yet on the first day of
 " the river's increase, the plague not only decreaseth, but absolutely ceaseth; not
 " one dying of it after?"

The following experiments were appointed for the next meeting :

1. Of the mouse in the compressing engine.
2. The prosecution of the experiment of Monsieur HUYGENS with a sucker applied to the receiver.

August 13. At the COUNCIL were present

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| The lord viscount BOUNCKER, | Dr. GODDARD. |
| president. | Mr. PALMER. |
| Mr. BALLE. | Mr. HILL. |
| Mr. EVELYN. | Mr. OLDENBURG. |
| Dr. WILKINS. | |

Mr. PALMER reported from the lawyers, that but one vice-president of the society could be sworn at a time.

The president was desired to give Mr. POVEY thanks in the name of the council for his care and endeavours to procure the Savoy for the use of the society: but withal to intimate to him, that by reason, both of want of accommodation sufficient there, and some inconveniencies found in the terms of the indenture, the council thought fit to withdraw from that business.

September 2. At a meeting of the SOCIETY Monsieur HUYGENS's experiment was prosecuted by the application of a sucker, but was brought to no issue at this meeting, and therefore to be continued at the next.

The experiments of closing up of gunpowder, *aurum fulminans*, and water, in three balls of steel severally, being again made; and that with gunpowder alone being fired and broken, it was debated, what might be the cause, that the gunpowder should fire, and not the gold powder, the latter being the stronger of the two? Some conceived, that a sulphureous matter might exude out of the heated steel, and be communicated to the gold powder, whereby its fulminating virtue might be deadened. Others thought, that this powder might fire within the ball (having left some air in it, because not filled full with the powder) and the noise not be heard at a distance. Others were of opinion, that the penning it in, and giving it but a slow heat, might make it melt, it being found sticking to the sides of the ball upon the cutting it asunder. It was ordered hereupon, that the operator should bespeak two balls with cavities no bigger than a pea, to fill them full severally with *aurum fulminans* and gunpowder.

Q q 2

Sir

Sir KENELME DIGBY suggested, that it might be tried, whether the gold-powder sticking to the sides of the ball, after its being heated, would fulminate in the open air.

Dr. WILKINS put the company in mind to improve their former consideration of making an history of the weather, in order to build thereupon an art of prognosticating the changes thereof : And he suggested, that it might be recommended to some of the members of the society, to make constant observations, at least of the most considerable changes of weather : in order to which, Mr. HOOKE was desired to engage herein, which he did; and Dr. WILKINS undertook to recommend the same to Dr. POWER. It was also thought proper, that Dr. WREN should be written to, to send to the society a scheme of his weather-engine, formerly proposed, in order to see whether it needed any addition or not.

Sir KENELME DIGBY related, that Dr. DEE¹, by a diligent observation of the weather for seven years together, acquired such a prognosticating skill of weather, that he was, on that account, accounted a witch.

Sir KENELME read a letter, sent to him out of the Palatinate, concerning some children snatched away in those parts by beasts, that had the appearance of wolves; but found killed after so strange a manner, that all people thereabout surmised, that they were not wolves, but *lycantrops*, seeing, that nothing of the bodies of those children were devoured, but the heads, arms, and legs, severed from their bodies, the skulls opened, and the brains taken out and scattered about the carcases, and the hearts and bowels, in like manner, pulled out, but not devoured. The society judged, that the truth of the matter of fact ought to be well attested, before any thing be pronounced of it.

Sir KENELME presented a letter written to him by Dr. STRAUS, physician to the landgrave of Hesse Darmstadt, concerning a foetus found petrified in part in the cavity of a woman's belly, out of the matrix; about which the writer of the letter disputed, whether it was a twin-sister, the foetus being found a female; or a daughter of the woman, out of whose belly she was cut; and concluded, that it was her daughter, which by the hardness of her body, and length of time, had broken through the matrix into the cavity of the belly, the matrix being healed up again of itself, and found cicatrised by the surgeon. This letter was ordered to be filed up.

Monf. HUYGENS presented a paper from his father Monf. ZUYLICHEM, containing a description of a new kind of candlestick, by means of which, the candle upon it gives more light than two torches together, consumes less wax, frees from the inconvenience of smoking in the narrowest room, and needs no snuffers. The paper was ordered to be translated from the French, and registered^a.

¹ JOHN DEE, an eminent mathematician in the reign of queen ELIZABETH, and warden of Man-

chester-college : he died about September, 1607, in the 81st year of his age.

^a Original register, vol. ii. p. 295.

Mr.

Mr. Hooke produced a microscopical observation of a worm bred in rain-water, and turned into a gnat.

Sept. 7. At a meeting of the COUNCIL were present,

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| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Mr. BRERETON. | Mr. HENSHAW. |
| Mr. BOYLE. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |

The 1st, 2d, 3d, and 5th statutes of the 3d chapter; and the 1st, 2d, 3d, and 4th statutes of the 8th chapter, passed, with a few alterations, the second time.

Sept. 9. At the meeting of the SOCIETY, Monf. HUYGENS's experiment was presented, with a sucker applied to the glass cane; but the water would not leave the top upon suction. The president was desired to make this experiment with mercury by himself, and to inform the society of the success of it; which he undertook to do.

The experiment with the two balls and two powders was deferred till the next meeting, the balls not being ready.

The president and Mr. BOYLE were desired to consider of the odd phenomenon in Monf. HUYGENS's experiment, for the finding a solution of it.

Mr. BOYLE mentioned the expanding of spirit of wine in a sealed glass in his engine upon the exhausting of the air. It was ordered, that the experiment should be tried before the society.

Mr. CHARLES HOWARD produced a letter of Mr. ROGER BRADSHAIGH to RICHARD GERRARD, esq; dated at Haigh, Aug. 25, 1663, confirming his former relation concerning a water and an earth in the estate of Mr. MOLYNEUX of Hawkley near Wigan in Lancashire, which would light a candle at half a yard distance. It was ordered, that an extract should be made of this letter, and re-gistered.

Mr. BALLE mentioned, that there is a place near Grenoble in France of the like nature, taken notice of by GASSENDUS in his *Philosophia Epicuri*.

Mr. BOYLE proposed, that two canes with quicksilver might be kept a while, one at Gresham-college, the other to be kept by himself, in order to observe carefully how they would vary, as to the ascent and descent of the quicksilver in several weathers. The Society thought proper that this should be put in execution.

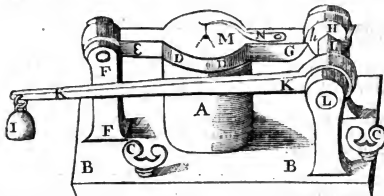
† Supplement to the Letter books, vol. iv. p. 59.

He proposed, that a sealed thermometer with spirit of wine might be kept in a good cellar for a whole year, in order to observe diligently how it would vary there in summer and winter. This was ordered to be executed, and the thermometer to be put in the cellar of Gresham-college.

Mr. OLDENBURG mentioned, that Mr. BEAL was willing to engage in the observation of the weather, and in registering the changes thereof; and that he hoped to set the same at work in other parts of the country; desiring to be furnished with thermometers of the same figure and size. Whereupon Mr. HOOKE was ordered to give the operator directions to provide a dozen sealed thermometers with spirit of wine, to be sent to Mr. BEAL, and into other parts of the world.

Mr. HOOKE brought in a scheme of the instrument for determining the force of gunpowder by weight, together with an explication thereof; which was ordered to be registered^a, as follows:

“ This instrument for the trial of powder consists of, A, an iron barrel, of what bore and thickness is thought convenient, fastened into an iron plate or pedestal B B, which pedestal may be fastened to any floor or ceiling by the screws C C:



“ This barrel is exactly clofed at the top by the cover D D, which is so even and truly wrought, as to touch it very closely, and in every place; one end E, of this cover is fastened by a joint into the pillar F F, the other end G, is kept down very firmly by the end or nick of the nut H: this nut is very powerfully kept in that posture by a weight I, hung upon the end of the beam K K, that is fast upon the same pin L L, to which the nut also is. In the cover is the touch-hole M, tapering outward, which hath a valve so contrived, with a spring N, that as soon as the touch-powder is fired, it is by the valve so close shut, that the strength of the powder cannot spend itself that way: a usual inconvenience not provided against in other contrivances.

“ The way of calculating what proportion of strength, placed at the middle of the cover, is requisite to move the weight I, hung at the end of the beam, is

^a Original Register, vol. ii. p. 298.

“ very

"very easy; for it will be as half the distance of the corner *b*, of the nut, from the axis of the pin *L L*, is to the distance of the weight *I*, to the force against the cover, which is requisite to move it when so kept down. So that if those distances are in a decuple proportion, five pound hung at *I*, will keep the cover as strongly down upon the end of the barrel, as an hundred weight set upon the cover *D D*, can do."

Mr. HOOKE produced likewise a microscopical observation of the several parts of a fly.

Sept. 14. At a meeting of the COUNCIL were present,

The lord viscount Brouncker,
president.

Mr. BOYLE.

Mr. BRERETON.

Mr. AERSKINE.

Dr. CLARKE.

Mr. PALMER.

Mr. HILL.

Mr. OLDENBURG.

The statutes for the election of the council and officers were read, but could not pass for want of a quorum.

Sept. 16. Dr. CLARKE read his experiments of the injections, which he had made of several liquors into the veins of dogs; and was desired to prosecute this subject; and the account brought in by him was ordered to be registered⁷.

Several reflections were made upon this discourse of Dr. CLARKE's, some observing, that any thing thus injected, without preparation and digestion, into the veins, would make odd commotions in the blood, disturb nature, and cause strange symptoms in the body; others suggesting thereupon, that trials should be made with such liquors, as were prepared of such things, as had passed the digestion of the stomach, as spirit of urine, of hartshorn, of blood, &c. in order to see what effects would follow upon them. Some proposed the experiment, to let the blood of a lusty young dog into the veins of an old one, by the contrivance of two silver pipes fastened to the veins of such two dogs with a leather pipe between both to move the blood forward; by which means the extravasating of the blood might be avoided. Others added, that these injections would hardly serve for any medical uses; but perhaps by filling the vessels of an animal as full as they could hold, and by distending them exceedingly this way, new vessels might be discovered.

Dr. WILKINS proposed the experiment of making a piece of the skin of a dog to grow upon another. Some things were objected against the probability of the success thereof, viz. how veins, arteries, and fibres, could disseminate themselves, and grow into this strange piece of flesh patched on; it being necessary, even to the restoring of a separated part to the same animal, that there may be left some

⁷ It does not appear in the Register. Doctor CLARKE's experiments are mentioned in the *Philosophical Transactions*, n^o 7. p. 130. for Dec 4, 1665, where it is remarked, that he had made it part of his business to pursue the experiments of conveying liquors into the mass of blood with much

industry, great accurateness, and considerable observations thereon; which, above two years since, were by him produced and read before the Royal Society, who thereupon desired him, as one of their members, to complete what he had proposed to himself upon that subject, and then to publish the same.

vessels,

vessels, and that they join one another; and it being hardly conceivable, how the healing can be effected, where the orifices of the said vessels do not meet. Others alledged experience and several examples of separated parts healed together again. It was ordered hereupon, that the experiment should be first tried with a piece of skin cut from the body of a dog, and sewed on again upon the same dog: and Dr. CROUNE and Mr. HOOKE were appointed curators thereof, and the operator ordered to provide a dog against the next meeting.

Mr. HOOKE was also desired to try the growing of hair, and of a cock's-spur upon the head of a cock.

It was suggested, in a letter from Mr. BEAL, that it would be worth the trial, to see what effects would be produced on plants put into the pneumatic engine with the earth about their roots, and flourishing; whether they would not suddenly wither, if the air were totally taken from them; and particularly to try, in the season, cherry-blossoms, when partly opened, partly not opened, upon a branch, whether the air may be so attenuated as to blast: To which he added this advertisement, that the blossoms do not immediately discover the blast, an old experienced countryman having once given him notice of a blasty noon (it being then sultry weather, and somewhat gloomy with the thickness of exhalations, almost like a very thin mist) and within a day or two shewing the proof upon the cherry-blossoms then flagging, but not much altering their colour till after two days more. It was ordered, that this suggestion should be taken notice of, and the experiments made in due season.

The operator was called upon for the thermometers, which he had been ordered at the last meeting to provide against this, to be sent into several parts, for the observation of the weather. They not being ready yet, he was ordered to take special care to have them ready against the next meeting.

He was directed likewise to have ready against the next meeting a cylinder of mercury, to be kept in Gresham-college, for the observing the ascent and descent thereof, according to the various constitution of the air; Dr. CROUNE mentioning, that he had found it rise and fall, according to the degrees of cold and heat, but with some air left in the cane; and Mr. HOOKE alledging, that Mr. BOYLE's cylinder had risen in summer, and fallen in winter; and ascribing this effect to the greater quantity of vapours exhaled in summer, causing more gravitation in the air.

It being again mentioned, that Dr. WREN's scheme for the observation of all the changes of weather should be sent for by Dr. WILKINS, the latter alledged, that he thought it was left with Mr. BOYLE, whom the secretary was therefore desired to speak to concerning it.

Dr. GLISSON shewed the society a seal of a certain compounded metal, of which he said he had heard, that when it was soft, it would take off the impression from any hard wax; and being grown fixed, retain that impression, and so serve for a seal.

Sept. 12. At a meeting of the COUNCIL were present,
 The lord viscount Brouncker, Dr. GODDARD.
 president. Mr. PALMER.
 Mr. AERSKINE. Mr. HILL.
 Dr. WILKINS. Mr. OLDENBURG.

It was resolved, that the order for collecting the arrears till Sept. 23. be renewed.

Dr. GODDARD was desired to bring in a draught of a statute for laying up all the society's monies in the chest, except 20*l.* to be left in the treasurer's hands for occasional expences.

Sept. 23. At a meeting of the SOCIETY, the president gave an account of the experiment committed to his charge, about the not descending of water purged from air, proposed formerly by Monf. HUYGENS, and several times tried before the Society; which the president affirmed to hold good upon every accurate trial, even with the addition of a sucker.

He was desired to prosecute the experiment with quicksilver, and to bring in the particulars of the whole success in writing, together with the solution of this phenomenon.

Mr. PELL made mention of a certain book, intituled, *Doxoscopia*, published by a famous professor of Hamburg, Dr. JOACHIMUS JUNIUS. He was desired to peruse this treatise, and to give an account of it to the Society.

Dr. WILKINS mentioned a person who had considerable collections of observations on the weather, made by Dr. DEE and others. He was desired to make the person acquainted with Mr. HOOKE.

Mr. BOYLE informed the Society, that he had spoken with one, who was come from Constantinople, and told him, that the rainy weather had accompanied him from that city all along through Italy and France into England; a fact thought observable, for the great extent of the same weather.

Two glass canes were recommended, one to the president, and the other to Dr. GODDARD, to have them filled with mercury, and to observe how they vary with the weather, comparing a thermometer of water with them, to see how they differ.

Dr. WILKINS was desired to write to Dr. WREN, for his scheme of the instrument for observing all kinds of weather.

There was read a petition of the fishmongers, presented to the parliament, concerning the annoyances, whereby the fry and brood of fish is destroyed, and the several ways, whereby the same may be preserved. This was communicated by Mr. GRAUNT, and ordered to be filed up.

There was also read a Latin letter, drawn up by Mr. OLDENBURG, the secretary, to be sent to Dr. ECCARDUS LEICNER of Erfort, in answer to his letter to the Society of the 16th of April, 1663, and read at the meeting of Aug. 26. It was ordered, that the answer should be sent, subscribed by the secretary^a.

^a Letter-book, vol. i. p. 92.

The operator was ordered to have ready against the next meeting the iron balls for the trying of gun-powder and gold-powder; as likewise the thermometers with spirit of wine; the compressing engine; and the dog, for the cutting off a piece of his skin, and sewing it on again.

Sept. 28. At a meeting of the COUNCIL were present,

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. ENT. |
| Mr. AERSKINE. | Dr. GODDARD. |
| Mr. BALLE. | Dr. CLARKE. |
| Mr. EVELYN. | Mr. HILL. |
| Mr. PALMER. | Mr. OLDENBURG. |

It was resolved, that there should be two distinct tables, one for the laws contained in the charter, and another for the by-laws.

Dr. GODDARD brought in a draught of the statute ordered at the preceding meeting of the COUNCIL; which was read, and passed the first time as follows:

"All monies, or sums of money, whereof there shall not be present occasion for expending or disposing to the use of the Society, shall be laid up in an iron chest, having three different locks and keys, whereof one shall be in the custody of the president, another of the treasurer, and a third of one of the secretaries; and the treasurer shall not have in his custody above twenty pounds at once; and accordingly, he shall pay in monies into the chest aforesaid, and take out of the same, by order of the Council, as they shall judge expedient."

All the statutes of the 5th chapter, concerning experiments, and the reports thereof; of the 7th, concerning the election of the council and officers; of the 9th, concerning the treasurer and his accounts; of the 11th, concerning curators by office; of the 12th, concerning the clerk; of the 13th, concerning the operator; of the 14th, concerning the common seal and deeds; of the 15th, concerning the books of the Society; of the 16th, concerning benefactors; of the 17th, concerning the death or recess of any fellow; of the 18th, concerning the causes and form of expulsion: all these passed the first time this meeting.

It was resolved, that an order be issued for the collecting of the arrears of the weekly payments till Sept. 23, 1663.

The president was desired to take care, that notice be given to Mr. SYMMONS, the engraver of the seal of the Society, to attend the Council at their next meeting.

Sept. 30. At a meeting of the SOCIETY, Mr. PALMER presented to the Society, from Mr. EDWARD DIGGS, with two sorts of silk, one coarse, the other fine, sent from Virginia, and made there; together with some written observations of Mr. DIGGS's concerning silk-worms, and the making of silk, contrary to the received opinion thereof. Mr. PALMER was desired to return the Society's thanks to the presenter, and to let him know, how much they were pleased with his care and concern for improving of this manufacture; and how glad they should be to receive infor-

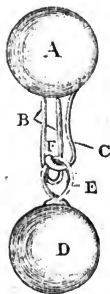
information, from time to time, of the progress of it. The observations were ordered to be registered^a, with a reference to those, which were communicated by Mons. MONCONYS; and some of the silk was given to Mr. HOOKE, to be examined with a microscope. Mr. HILL was desired to get the parcel of the coarser silk to be put into a stuff for a cover to the mace; and Dr. GODDARD to keep the parcel of the finer silk.

Mr. PELL suggested, that since the silk-worm feed, procured from Languedoc, yielded worms and bottoms in Virginia, as big again as they usually have there of their own feed, some of the Virginia feed might be sent into Languedoc, to see how that would thrive there.

A letter was read, written by Mons. DE LA QUINTINYE to Mr. OLDENBURG the secretary, concerning the necessity of replanting melons; concluding with expressions of his singular respect for the Society. It was ordered, that this letter should be filed up^b, and that the secretary, in his private answer, should let him know, that the Society received his civilities kindly.

Mr. HOOKE brought in the description of the new ways contrived by him for sounding the depth of the sea without a line, and fetching water from any depth; which were ordered to be registered^c, as follows:

“ The way, which I prefer before several other contrivances, which I thought
“ of, for sounding the depth of the sea; and fetching up water from any depth,
“ are these :

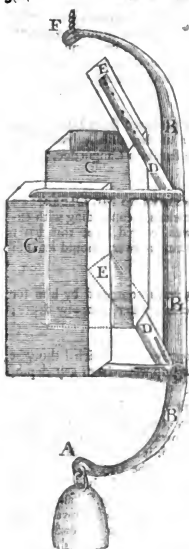


“ The first is with a ball sunk to the bottom of the sea
“ by a weight of lead or stone, the which, as soon as it
“ toucheth it, presently returns toward the top of the water,
“ leaving the weight behind, which is thus contrived. Be-
“ tween the long wire staple B, of the ball A, I press in
“ with my fingers a springing wire C, on the bended end F,
“ on which I hang the weight D, by its ring E, and so let
“ them down into the water in this posture; towards the
“ bottom of which they are carried with a considerable
“ swiftness; which the weight D touching first, is thereby
“ stopped; but the ball, by the impetus it acquired in de-
“ scending, being carried downwards a little after the other is
“ stopped, suffers the springing wire C, to fly back, and
“ thereby sets itself at liberty to re-ascend.

^a Original Register, vol. ii. p. 100. They are printed in the Philos. Transact. n^o 2. p. 26.

^b It is entered in the Letter-book, vol. i. p. 85. This letter is dated at Paris, 25 June, 1663.

^c Original Register, vol. ii. p. 301.



“ The way for fetching up water from any
 “ depth in the sea, is with a square wooden
 “ bucket C, whose bottoms E E are so con-
 “ trived, that, as the weight A, sinks the iron B,
 “ (to which the bucket C, is fastened by the two
 “ handles D D, on the ends of which are the
 “ movable bottoms or valves E E) and conse-
 “ quently draws down the bucket, the resistance
 “ of the water to its descending, keeps up the
 “ bucket in the posture C, whereby the water
 “ has all the while it is descending, a clear pas-
 “ sage through; whereas, as soon as the bucket
 “ is pulled upwards by the line F, the resistance
 “ of the water to that motion beats the bucket
 “ downwards, and keeps in the posture G,
 “ whereby the included water is preserved from
 “ getting out, and the ambient air from getting
 “ in.”

Mr. Hook² produced likewise three microscopical observations; 1. Of the scales of a foal's-skin, presented by Mr. PELL. 2. Of a piece of tabby. 3. Of the beard of a wild oat.

He was ordered to speak to Mr. CHILDREY⁴, concerning his collection of observations on the weather, and to make report thereof to the Society; as also to try, whether Mr. CHILDREY would grant the perusal of them for the service of the Society.

⁴ Author of *Britannia Rhapsica*.

It was ordered, that Mr. MATTHEW WREN be put in mind of procuring from the lord chancellor the papers of Mr. HARRIOT, who had also made considerable observations on the weather.

Mr. COLWALL mentioned, that Mr. BOND was very sure, that, according to his magnetical hypothesis, the variation of the needle at London was this year 1 deg. 4 min. westward. Mr. BALLE was desired to make an observation hereof.

October 5. At a meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. BALLE. |
| president. | Mr. HENSHAW. |
| Sir ROBERT MORAY. | Dr. WILKINS. |
| Mr. BOYLE. | Dr. GODDARD. |
| Mr. BREKETON. | Dr. CLARKE. |
| Sir PAUL NEILE. | Mr. PALMER. |
| Sir GILBERT TALBOT. | Mr. HILL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |

All the statutes, which passed September 28 the first time, passed this day the second time.

The accounts of the treasurer from the beginning of the Society till June 24, 1663, passed; by which it appeared, that

| | <i>l.</i> | <i>s.</i> | <i>d.</i> |
|--|-----------|-----------|-----------|
| The sum given in charge was - - - - - | 697 | 0 | 0 |
| Whereof received - - - - - | 527 | 5 | 6 |
| In arrears from divers members of the society till June 24, 1663 - | 158 | 4 | 6 |
| Disbursed by the treasurer - - - - - | 488 | 8 | 3 |
| Remaining in the treasurer's hands - - - - - | 38 | 17 | 3 |
| Remitted to several members of the society by order of the council | 11 | 9 | 0 |

It was ordered, that the president, Sir ROBERT MORAY, and Mr. BOYLE meet and consider of the draughts brought in by Dr. WILKINS and Dr. GODDARD concerning the entertainment and allowance of curators by office, when the society shall be indowed with a revenue.

It was resolved, that the experiments formerly brought in for the king's reception be farther considered of; and that this be the work of the council at their next meeting.

It was ordered, that Dr. CLARKE endeavour to get the collection of insects mentioned by him this day, against the king's reception: And

That Mr. HOOKE be desired to be present at the next meeting of the council.

October 7. At a meeting of the SOCIETY, a mouse was put into the compressing engine; and though four times as much air was forced into it, as was in it, yet the animal appeared not to receive any alteration thereby. Mr.

Mr. GRAUNT produced a stone sent out of Derbyshire, in which there seemed to be natural stony screws; but upon examination it was found, that they were not screws, but parallel circles.

He gave an account of Sir WILLIAM PETTY's new ship's having suffered a great storm in the harbour of Dublin, where it was riding at anchor with one only man in her, who cut the cable, and let her drive ashore, where she bulged a plank; upon the repair of which the ship would immediately come away for London.

The president acquainted the society with the success of Monsieur HUYGENS's experiment made by him with mercury, viz. that upon the exhauing of the air, the quicksilver had stood 34 inches high; and that he had observed, that it never fell but when a bubble broke: as also, that when it fell and broke, it fell at once as low, as it would fall by three suction. Upon which he was of opinion, that no account could be given of this phenomenon from the equiponderancy of the air; and consequently the standard of the mercury being 29 inches, the rest must be from some other cause.

Mr. BOYLE seconded this relation, affirming, that he had made the like experiment, and found the quicksilver stand at above 50 inches; and he acknowledged, that something else must be taken in to explain this odd phenomenon.

The president and Mr. BOYLE were both desired to prosecute and consider farther this experiment, and to give both the matter of fact, and their thoughts of the cause of it, in writing.

Sir ROBERT MORAY produced a round stone given in by Mr. GODOLPHIN, who affirmed it to have been broken out of a rock. It was recommended to Mr. BOYLE to break it, and observe the quality of it.

Sir ROBERT MORAY produced also a mineral presented to him by Col. LONG, in whose ground it was found, smelling like sulphur, and strongly tasting of vitriol; which Mr. BOYLE also was desired to take home with him, and to examine it.

Capt. SILAS TAYLOR mentioned, that there was a mine in Cornwall an hundred fathom deep, concerning which Col. NOY, living in that country, had made a considerable discourse, which by means of Dr. HOARE might be obtained of him. It was ordered, that Dr. HOARE should be spoken to concerning it; as also, that Dr. MERRET should be desired to communicate to the society what he knew of the ores and minerals of Devonshire and Cornwall; and that Dr. COTTON should be written to by Mr. BALLE, to procure the best information he could concerning that subject.

The two iron balls, one filled with *aurum fulminans*, the other with gunpowder, were tried in a coal-fire, where that with gunpowder fired and gave some report, yet without breaking the ball, only making a little crack in it; but that with *aurum fulminans* did nothing.

Dr.

Dr. GODDARD was desired to add these trials to his former account concerning the like experiments.

Mr. HOOKE's paper concerning the observables for making a history of the weather was read, and ordered to be reviewed by the president and Sir ROBERT MORAY, and then to be registered, and sent to the several persons, who had been engaged in this work of observing the changes of weather, as Dr. POWER, Mr. BEAL, &c.

The operator produced four of the thermometers, which he had been ordered to provide and adjust; of which the president was desired to take one, and Dr. GODDARD another, to put them into their cellars, and to observe whether they were warmer in winter than in summer.

For the adjusting of these thermometers it was thought sufficient to know what mark they stood at then; and for the making of observations, to take notice, how they should afterwards differ from this mark.

Mr. HOOKE was ordered to bring in at the next meeting an hygroscope made of the beard of a wild oat, with an index.

Dr. GODDARD proposed for an hygroscope the contrivance of a lutestring with pulleys and a cylinder; and was desired to try it.

He gave some account of the variations of quicksilver in a glass-cane, having observed, that it varies not according to wet or dry, hot or cold, but according to the thickness or clearness of the air, having found it lowest, when the air was thickest.

Sir ROBERT MORAY promised to send in at the next meeting some bottles of water, which had been carried from England into the East-Indies, and brought back again.

Mr. HILL related, that a ship-master had told him, that he had in the Mediterranean drawn some of the water, that was grown stinking in the close vessels, into tubs, where having stood exposed to the air for two or three days, it was grown sweet again, and good to drink.

Dr. CROUNE acquainted the Society, that Dr. PUGH, who had formerly given them some informations concerning the Pico of Teneriffe, had good hopes of procuring a couple of the embalmed bodies of the *Guanches* in the Canary islands.

Sir ROBERT MORAY mentioned a new way of hatching pigeons used by Dr. WALLIS, and put in writing. It was ordered to be read at the next meeting.

Mr. BOYLE communicated an easy method of preventing the rot in sheep: which was likewise ordered to be read at the next meeting.

Otober.

October 12. At a meeting of the COUNCIL were present

Dr. WILKINS, vice-president.

Dr. GODDARD.

Mr. BOYLE.

Dr. CLERKE.

Mr. AERSKINE.

Mr. PALMER.

Mr. BALLE.

Mr. HILL.

Mr. EVELYN.

Mr. HOOKE.

Mr. HOOKE was also present, according to the order of the last meeting of the council.

This meeting being appointed for the farther consideration of experiments fit to entertain his majesty with, several of the members present were charged to be curators of the following experiments :

Mr. BOYLE,

1. To make the mercury stand above the usual station.
2. To make a consistent substance of spirit of wine and a certain other liquor.
3. To make two liquors smoke by approach.
4. To sink a substance in a glass by pouring in more water.
5. To make two polished marbles adhere, notwithstanding a great weight appendant to the undermost.
6. To make water ascend by suction.
7. To turn a greenish opacious liquor, partly into a transparent red, and partly into a whitish substance, by the affusion of a clear liquor.
8. To try the magnetical experiment of altering the polarity by repercutting the extremes of an iron-rod, made red-hot and refrigerated, and also of destroying all the magnetism by striking it in the middle.
9. To destroy the attractive virtue in a load-stone by heating it red-hot, whilst it keeps the directive virtue.

Dr. GODDARD,

1. To provide his hygroscope with pulleys and lute-strings.
2. To make a great weight float with a very little water.

Dr. ENT,

To bring in the anatomy of a lobster and an oyster to be drawn by Mr. HOOKE.

Dr. CLARKE,

To provide the collection of insects mentioned by him at the preceding meeting of the council.

Col. LONG,

To bring in his apparatus formerly offered by him on the 6th of July, and for that purpose to be written to by Mr. OLDENBURG.

Mr. HOOKE,

1. To take care of preparing those experiments, that stood upon his account.
2. To make ready the two thermometers of Dr. WREN's invention, one of tin, the other of glass.
3. To make an artificial eye.
4. To try the casting of a picture on a wall in a light room; and to bespeak a concave glass for it.
5. To give order for the making of the engine, to determine the force of gun-powder in by weight.
6. To make a hygroscope with the beard of a wild oat.

It was ordered, that the astronomical quadrant, contrived by Dr. WREN, be produced at the time of his Majesty's reception: And

That a book be provided by the amanuensis for his majesty's subscription.

It was voted the first time, that in the statute of the obligation to be subscribed, these words, *or to be elected*, be, in both the places, where they occur in this statute, repealed.

October 14. At a meeting of the SOCIETY, the following receipt to prevent the rot of sheep presented by Mr. BOYLE, and affirmed by him to have been made use of by a person of note with good success, was read, and ordered to be registered*.

"A pretty while before Allhollantide the sheep is to be blooded under the eye, and, if need be, he is to be blooded in the spring; and in October his gums may be rubbed at three or four different times with Spanish salt. But the main part consists in this, that about Allhollantide, or somewhat sooner, you take a small handful of the forementioned salt, and making the sheep hold up his head, compel him to swallow it, and keep him from drinking any thing for about an hour after."

A new way of hatching pigeons, sent from Oxford, and there tried by Dr. WALLIS, was read, and ordered to be registered[†], as follows:

"Keeping some tame pigeons about our house. we had a pair hatched on the 13th of July last, the day of our public act at Oxford. The next morning we went from home; and having been absent almost seven weeks, we found, upon

* Original Register, vol. ii. p. 303.

[†] Ibid. p. 303.

“ our return, this pair of pigeons well grown and lively ; and making a nest as
 “ others do, when they are ready to lay eggs and sit. But not finding them to
 “ lay (as indeed at that age it could hardly be expected) we did, about the 2d or
 “ 3d of September, take two eggs, newly laid, from another pair, and put under
 “ these young ones : who, though too young to lay eggs of their own, did sit on
 “ these very diligently by turns (as the cock and hen-pigeon use to do) ; which
 “ they were so desirous to do, that they would often fight for the nest, or pull one
 “ another off ; or at least sit waiting with much patience for the nest.

“ And they did on Monday last, Sept. 21, hatch two young ones (themselves
 “ being that day ten weeks old) and are now brooding them as older pigeons do.

“ That pair, from whence these eggs were taken, did, within four or five days
 “ after, lay again, and do now sit, almost ready to hatch.

“ That pair, from whence these two young breeders were hatched, have already
 “ laid and brought their eggs to good seven times since March last. And the
 “ hen of, their first brood, hatched in March, hath, with another cock (her own
 “ mate being stolen, or killed, or otherwise mis-carried, we know not how) laid,
 “ and hatched, and is now brooding her young.”

Mr. BOYLE gave some account of the mineral committed to his examination at
 the preceding meeting ; and he affirmed it to abound with vitriol mixed with some
 brimstone ; and that a solution of copperas made of it, and put to galls, turned
 not to black, but blue : as also, that some of the mineral being laid in a window,
 got an effervescence of the taste of vitriol. He was desired to examine it farther,
 and to see whether it will shoot, &c.

Dr. HOARE being spoken to concerning the account of the Cornwall mines,
 mentioned at the last meeting to be written by Col. Nov, promised to communi-
 cate it to the society within a little time.

The experiment of making the quicksilver stand above its usual station was far-
 ther inquired into ; and Mr. BOYLE affirmed, that he had tried it again, and kept
 it suspended to the perpendicular height of 52 inches with water. It was again
 recommended to his farther prosecution,

The operator was called upon for the rest of the thermometers, to have them
 ready against the next meeting.

Occasion was here taken by Dr. WILKINS to inquire about the original of this
 kind of thermometers with spirit of wine, sealed up : to which Mr. BOYLE an-
 swered, that they were brought out of Italy ; and that he thought, that he had
 received thence the first thereof here in England.

It was queried, whether this way might be practicable with common water ;
 and Dr. GODDARD affirmed, that he had tried it so, and found the greatest varia-
 tion thereof to be not above two inches.

Dr.

Dr. CROUNE and Mr. HOOKE not having yet met to cut a piece of dog's skin and sew it on again, in order to see whether it will grow; and Dr. CHARLETON affirming, that he had tried this experiment formerly, he was desired to meet on the Friday following, with the other two curators at Gresham-College, and there to make the experiment together.

Mr. HOOKE was desired to lodge some days in Gresham-College for the well-fitting the compressing engine, and the giving order to the operator for the making the engine described by him to determine the force of powder by weight; as also for the artificial eye, and the perfecting Dr. WREN's new kind of thermometer with two round glasses and quicksilver in them.

Dr. CHARLETON not having yet procured the unspleened dog from Bath, to open him, and to see, whether any thing was come in the place of the spleen cut out, or what change there might be about those parts; Dr. HOARE affirmed, that he had himself opened such kind of cut dogs after a whole year's exsection, but found nothing grown instead of the spleen, nor any thing else remarkable in those parts.

Dr. HOARE related, that he saw a person, who by the parings of horse-hoofs fried in any sweet oil, and carried in his pocket, made any dog follow him, and leave any other meat for this.

Mr. BOYLE observed, that the parings of horse-hoofs had been found good to stay fluxes, having a considerable quantity of volatile salt in them.

Dr. HOARE promised to bring in an account of a cock's spurs growing on a cock's head.

Mr. CLAYTON affirmed, that he had seen at Dr. BROWN's a horn growing on a cock's head naturally.

The operator was ordered to provide a cock against the next meeting, in order to try the experiment of making feathers grow on his comb.

Mr. BOYLE mentioned, that a person had made a horn to grow on the forehead of a horse.

Mr. CLAYTON related, that a lady having lost one of her teeth, a porter was hired, one of whose teeth was drawn by LA ROCHE, and put into her mouth, where it grew firm.

This was confirmed by Dr. WHISTLER, who related, that the same LA ROCHE hit on this art accidentally, having once drawn out the wrong tooth of a countryman; for which mistake LA ROCHE finding him extremely enraged, he told him, that if he would have but a little patience, he would put the tooth in, and make

it grow again as firm as before; which he accordingly did, setting in the good tooth, and putting the gums carefully about it.

Dr. CHARLETON mentioned, that the lord HATTON's son having some of his teeth standing much awry, had them loosened, but without pulling them quite out, and set strait.

Mr. WATERHOUSE acquainted the Society, that he had spoken with Mr. CHILDREY concerning his collection of observations of all kinds of weather; and that Mr. CHILDREY was willing to communicate them to the society after he had looked them over, and brought them into some order.

Mr. HOOKE communicated two microscopical observations, one of a common fly, the other of moss grown upon a brick, together with the seed.

Mr. EVELYN produced the measure of a yew-tree standing at Braburn, two miles from Scots-hall in Kent, being twenty yards in compass, and seventeen feet at least in diameter.

October 19. At the meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Mr. BOYLE. | Dr. CLARKE. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |

It was voted the second time, that in the statute for the obligation to be subscribed, these words, *or to be elected*, be in both the places, where they occur in this statute, repealed.

The whole body of the statutes was read, and ordered to be written fair by the amanuensis.

It was ordered, that Mr. HOOKE have the keeping of the repository of the Society, for which the west gallery of Gresham College was appointed: And

That one of the new instruments for sounding without a line be made ready by Mr. HOOKE, amongst the other things designed for his majesty's reception.

Upon a proposal of Mr. BOYLE concerning some overture made by another person of considerable advantage to the society, which in the nature of it required secrecy, it was ordered, that the lord viscount Brouncker, Sir ROBERT MORAY, and Mr. OLDENBURG have full power to treat and agree with the said person upon such terms, as they shall think reasonable for the good of the society.

* Or white. Dr. WARD's Lives of the professors of Gresham-College, p. 174.

It was likewise ordered, that the common seal of the society be produced and shewn to the society at their meeting.

October 21. At the meeting of the SOCIETY, an account was given by Mr. OLDENBURG, the secretary, of a letter^a written to him from Paris October 12, 1663, N. S. by Monsieur PETER PETIT^b, a member of the Montmorian academy at Paris, desiring in the name of the said academy to be informed from the society, what had been the transactions of Monsieur DE SORBIERE amongst them, when he was present at their meetings; and in particular, whether he had pretended to be by the said academy deputed to establish a stricter correspondence. Monsieur PETIT observed, that Monsieur DE SORBIERE had no orders from the academy, having gone to England without acquainting any person, except Monsieur DE MONTMOR, with his intended journey thither; and that the academy would not have been guilty of so great an incivility, as sending him without a letter to the society and the president, if they had had any intention of deputing Monsieur DE SORBIERE for the establishing a nearer correspondence: nor was the academy pleased with his printing a discourse, after he had been desired and had promised not to do it. The society upon hearing the account of this letter declared, that the said Monsieur DE SORBIERE had pretended to no such deputation, nor transacted any thing with them in the name of the Parisian academy; and it was ordered, that the secretary should signify this in his answer to Monsieur PETIT; which he did in a letter in French of the 30th of this month^c, in which he observed, that Monsieur DE SORBIERE had, at the meetings of the society, behaved himself with all possible civility, and, in his private conversation with the members, only testified his zeal for the advancement of solid and useful science; on which account, as well as that of his being of the Parisian academy, he had been admitted into the Royal Society the same day with Monsieur HUYGENS^d. Mr. OLDENBURG added, with regard to a stricter correspondence between the society and academy, that it did not appear to him to want the being enforced by formal deputations; since the nature of the thing required it, the object of science being of so vast an extent, that it demanded the united genius of more than one nation to exhaust the subject.

Mr. COLWALL presented the society with the answer to some of the inquiries formerly sent by him to the East-Indies; and acquainted them, that these inquiries

^a Letter-book, vol. i. p. 104.

^b eminent for a great number of learned works upon various subjects. He died at Paris December 12, 1687, in his 71st year.

^c Letter-book, p. 105.

^d Monsieur DE SORBIERE being informed of the charge against him of having assumed the character of deputy from the academy of Monsieur DE MONTMOR to the Royal society, wrote a letter to Mr. OLDENBURG from Paris on the 6th of December 1663, N. S. appealing to him for his justification in that article, expressing at the same time his high sense of the honour done him by the Royal Society, in electing him into their body;

^e Letter-book, vol. i. p. 123.

and desiring some account of their establishment, and a copy of their statutes, when printed or an abstract of them, to be made use of in a relation, which he was drawing up of his voyage to England. Mr. OLDENBURG, in his answer, dated at London January 3, 1664, sent him the substance of his letter to Monsieur PETIT; and after informing him, that Mr. BOYLE's treatises on *Colours* and *Cold*, and Dr. WALLIS's *Arithmetica Geometrica* would soon be published, excused himself from anticipating the history of the establishment of the Royal Society, which was ready to be committed to the press by one of their friends; and was undoubtedly that four years after published by Mr. SPRAT.

† Ibid. p. 122.

were so well received in those parts, that they had been sent to all the English factors there, and had excited them to a curious search and observation of many other things, of which the Society might, in time, expect a good account. This answer, which was written at Bantam, Nov. 14, 1662, was ordered to be registered^a, and was as follows :

“ Bettele (so called by the Portuguese) or Seeree (according to the Malayan language) is esteemed abundantly wholesome by all people in those parts, being eaten with a little fine flaked lime, and a quarter or half of Arecca or Benang-nut. Without it, the natives could hardly subsist, for their food consisting chiefly of boiled rice, fruit, fish, &c. they find this very comfortable to the stomach, and much conducing to a good digestion; and the chewing of it may be well thought a good expedient for the extinction of thirst: for the natives (though in this hot climate) drink very little, only washing their mouths with water, after chewing of the said Seeree, and after their tobacco (which for calefying their stomach they often take). But it is observed, that those, that use it much, seldom have any teeth in their heads, or none good, after thirty years of age, which is imputed to the heat of the lime; yet, for the aforesaid reason, and prevention of an offensive breath, they all use it: and that it hath this latter quality is most evident, for in their Poassa (which answers to our Lent) when it is not lawful for any to eat from sun-rising to sun-setting, their breath is very noisome; inasmuch, that speaking to one another, they will hold a clout before their mouths. This also, being well mixed, giveth a pleasant red tincture to the lips, and more or less, according to the quantity of the lime. Instead of the leaf, the people in the Celebes often eat a fruit called Seerec-boea (which is much like to long-pepper in view) being dipped in oil, rolled in lime, and so dried, for its better preservat.on. This giveth a more pleasing taste, and maketh a fragrant breath; and being eaten in England, with a little lime and some old benang (for that the young will not keep till it come home) I believe it will have the same operation.

“ Arbor-triste receiveth its name from its nature, whilst (as it were) disconsolate in the day, it only spreads its flowers after sun-set, and sheds them all before sun-rising. One of these I myself have seen at Batavia, and observed. The flower is a small white flower, with orange-coloured sprays in the middle, pretty to the eye, and not displeasing to the smell. Of any water distilled from them I never saw, and shall therefore therein plead ignorance.

“ Poison, that which so famous is, under the notion of Macassar-poison, is made on the Celebes, by a people inhabiting the mountains, which run through the heart of that island, and are called Traia-people. The ingredients I could never yet discover, but such is the effect, that a small arrow being imbued with it, giveth a fatal wound, if it draw blood in any place, and is incurable; the best antidote being human ordure, which being crammed down the throat, enforceth so strong a vomit, that it often cureth. And for this purpose, the Dutch offi-

^a Original Register, vol. ii. p. 313.

“ cers many times command their foldiers, engaging in an enemy's country, to carry with them their own excrement. The natives are very chary to preserve it from the air, inſomuch, that it is almoſt incredible, with how warm cloths they wrap it and rub it: yet have I ſeen a Malayan ſwallow down pills of it, pretending it antidotal; and a Traia-man, after a wounded fowl had been killed by the venom of that poiſon, cut out a little of the ſurrounding fleſh, and ſo dreſſed the wounded fowl and eat it.

“ Camphire is credibly reported to be the gum of a tree: I myſelf have had cabinets made of camphire-wood, which have a very ſtrong ſcent.

“ Bird's neſts, about divers of the iſlands in the South-ſeas, are found amongſt the cliffs and rocks, a fort of tough things, much like a bird's neſt, and almoſt tranſparent; uſed as a delicious food; and from their reſemblance or nature, called by the natives, Bird's neſts: And indeed, the moſt credible opinion is, that they are really the neſts of birds, which ſitting on their own eggs (which there lie in great heaps) make ſuch an impreſſion on them, the ſhell decaying, or being caſt out, and the yolk and white blended together, in that form. And thus the natives affirm it.

“ Rhinoceros-horn is eſteemed antidotal, and of much value among the Chineſe, if carved into drinking cups, of which I myſelf have now three, ſo rarely cut, that I value them above twenty rixdollars apiece. If the horn be good, and any filthy or venomous liquor be put in it, you will perceive the water to bubble up with a gentle ſufuration.

“ Pedra de Porco is a precious light ſtone, found in a hog (as bezoar in a goat, &c.) principally at Timor and Solor, of a very bitter taſte, and eſteemed incomparably above bezoar.

“ Ambergrife is chiefly found in the South-ſeas, about the ſmall iſlands of Timor and Tenimbar, Serera and Aru; is principally expoſed to ſale by the poor exiles Bandancie, who uſe the trade of thoſe parts to get a little maintenance; and thoſe men do aver, that the grey amber is the excrement of a very great fiſh; and the white its evomition: and that the natives obſerving ſuch fiſh to viſit the coaſt, do diligently take notice, when they ſee them duck their heads, and void backwards; or erect their heads, and vomit forwards: and thereupon viſit, with their ſmall boats, the adjoining rocks and ſhores; where they find it in huge great lumps, lay it in the ſun to harden it, and then cutting into ſmall pieces, divide it into reſpective ſhares.”

Sir ROBERT MORAY cauſed to be brought two bottles, well ſtopped, of Thames-water, ſent by him to the Eaſt-Indies, and returned from thence; which being opened, had ſomething of the ſmell of pump-water in ſhips. It was recommended to Dr. GOODARD to make ſome trials of it; 1. by way of diſtillation, to ſee what ſpirit it would yield; 2. by approaching a flame to it, to ſee whether it would burn;

burn; 3. by putting it into the engine in some glass cane, to see whether it had as much air in it as ordinary water, &c.

He gave an account of the two pendulum-clocks sent by Major HOLMES into the Straights, and now returned; viz. that they were presumed to have gone equally even in the rough seas. It was ordered, that the said clocks should be recommended again to the major, for reiterating the experiment in his next voyage; and that they should be hung cross. The account of the going of the two watches, from the 28th of April to the 4th of September, 1663, was ordered to be registered^a.

The operator produced the dog, a piece of whose skin had been cut off and sewed on again; and he related, that as soon as the skin was cut off, it shrunk into half its dimensions, so that they could not stretch it out so far as to cover the whole flesh with it, as it had done before; but yet it looked as if it would grow on again. The whole process was ordered to be given, in writing, by Mr. HOOKE.

The operator produced again the thermometers with spirit of wine, and said, that they all did agree at the figure 8. It was ordered, that one of them should be kept by the Society as a standard, and all the rest so adjusted, as to agree therewith.

One of these thermometers was ordered to be given to Mr. WATERHOUSE for Mr. CHILDREY; another to Dr. CROUNE for Dr. POWER; a third to the secretary for Mr. BEAL.

Mr. HOOKE shewed a hygroscope, made of the beard of a wild oat, advancing and returning according to the dryness or moisture of the weather.

He likewise produced the microscopical observation of a part of a fly's wing.

Dr. WALLIS's account of the new way of hatching pigeons being again taken notice of, Sir ROBERT MORAY related, that the king, when very young, meeting with a black-bird's nest, and finding but one young one in it, carried it home in the nest, and put it to a thrush in a cage, who fed the black-bird as carefully, as if it had been her own, but with this difference, that whereas other birds feed their young ones first before they feed themselves, the thrush fed herself before the black-bird.

Dr. HOLDER mentioned, that he had seen roaches having both milt and spawn.

Dr. ENT affirmed, that several frogs had both milt and spawn.

The president acquainted the Society, that he had made the mercurial cylinder stand at 55 inches with very little water; and proposed to prosecute the experiment.

^a Ibid. p. 304.

Sir ROBERT MORAY promised to send in a piece of copper ore brought from Sweden. And every member of the Society, who had had the opportunity, was desired to bring in ores of several kinds, to be put into their repository.

Mr. HOOKE was appointed curator for the ingrafting of feathers upon a cock's comb against the next meeting.

Mr. CLAYTON produced a kind of diamond, which being rubbed upon any glove or cloth, shone in the dark; and being warmed at a candle, glimmered to admiration.

October 26. At a meeting of the COUNCIL were present,

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| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Mr. EVELYN. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Dr. WILKINS. | Mr. OLDENBURG. |

The 1st and 2d statutes of chap. 11, concerning the allowance and business of curators by office, passed the first time.

It was ordered, that Dr. WILKINS and Dr. GODDARD draw up a statute for the duty of the printers of the Society.

October 28. The COUNCIL met again, there being present,

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Dr. CLARKE. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Dr. WILKINS. | Mr. OLDENBURG. |

The 1st and 2d statutes of chap. 11, concerning the allowance and business of curators by office, passed the second time.

The commission for the printers to the Society was read, and Mr. PALMER was desired to advise with Mr. ELLISE concerning the form of it.

At a meeting of the SOCIETY on the same day, the president reported to them from the COUNCIL, that because the stationers and printers are of one and the same company, and may, by the confession of both sides, practise both trades promiscuously, the Society might choose a stationer for their printer, without any violation to their charter, which gives them power to choose printers. Whereupon Mr. JOHN MARTYN and Mr. JAMES ALLESTREE being recommended to the Society, it was put to the question, whether it should be the question, that the office of printer to the Royal Society should be conferred on the said Mr. MARTYN and Mr. ALLESTREE jointly; and it was carried in the affirmative: after which, those two persons were put to the ballot, and chosen.

ARCHIBALD earl of ARGYLE was proposed by Sir ROBERT MORAY for a fellow of the Royal Society, and, by reason of his quality, chosen the same day unanimously.

Mr. THOMAS COKE was proposed a candidate by Mr. BOYLE.

Mr. HOOKE was charged to provide, from time to time, such experiments for the compressing engine, as he should think proper.

He shewed a microscopical observation of a pismire.

He was desired to take care and give directions, that Major HOLMES might be furnished with a dozen of his new balls with leads for sounding.

The operator was ordered to make ready the engine for the trials of gunpowder; as also a thermometer and a mercurial cane, to be sent with Major HOLMES; and thermometers for Capt. TAYLOR, Mr. WINTHROP, and the governor of St. Helena.

Mr. HILL was desired to take care of some Thames-water, to be sent in bottles of white glass with glass stopples to the East-Indies, to observe the better the change of the colour of the water.

He was appointed curator for having some rain and river water brought from Guinea, it being affirmed, that the waters of that country are liable to putrefy sooner than those of this part of the world.

Dr. WALLIS was desired to consider, what inquiries might be sent and recommended to the English governor of St. Helena.

Sir ROBERT MORAY produced some horse-teeth petrified, brought by prince RUPERT out of Germany.

He produced also a piece of copper-ore, sent him out of Sweden, and presented to the Society for the repository. It was ordered, that Mr. HOOKE, as keeper of the repository, should always affix some note to the things in it, by which it might be known what they are, and by whom they were presented.

Sir ROBERT MORAY was desired to inquire of his friend in Sweden, what variety of copper-ore there is in that kingdom, and how rich they are?

Dr. CHARLETON, Dr. CROUNE, and Mr. HOOKE, were again appointed curators of the experiment of planting a cock's spur on a cock's head; and the operator was ordered to provide a fit cock for it against the next meeting.

Dr. CHARLETON was also desired, together with Mr. HOOKE, to repeat the experiment of cutting off a piece of a dog's skin, and sewing it on again: and the operator was ordered to provide another dog for that purpose.

The operator tried the experiment of making feathers grow upon a cock's comb, with the mixture of bole-armoniac and the white of an egg.

Mr. BOYLE delivered in a paper, containing his observations upon Mr. CLAYTON's diamond; which was ordered to be registered*.

November 2. At a meeting of the COUNCIL were present,

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. CLARKE. |
| Mr. AERSKINE. | Mr. PALMER. |
| Mr. BALLE. | Mr. HILL. |
| Mr. HENSHAW. | Mr. OLDENBURG. |

Mr. PALMER reported from Mr. ELLISE, that the draught of the commission for the printers of the Society was in good form.

The said commission passed as follows :

" The president, council, and fellows of the ROYAL SOCIETY of London for improving natural knowledge, to all persons, who shall read or hear these presents greeting. Whereas by his majesty's charter under the great seal of England, is given and granted to us full power and authority, to choose one or more printer or printers, for matters and affairs relating unto or concerning the said Society, we do, by these presents, declare JOHN MARTYN and JAMES ALLESTRY, citizens and stationers of London, jointly chosen, in due manner and form, according to the said charter, to the office of printer to the Royal Society aforesaid, according to the said charter, sworn to deal faithfully and honestly in all things belonging to the trust committed to them, as printers to the said Society, during their employment in that capacity. And we do, by these presents, give and grant unto the said JOHN MARTYN and JAMES ALLESTRY full power and privilege to print all such things, matters, and businesses, concerning the Royal Society aforesaid, as shall be committed unto them by the president and council of the said Society, or any seven or more of them (whereof the president always to be one) or by the major part of the said seven or more. And we do farther give and grant unto the said JOHN MARTYN and JAMES ALLESTRY, that no other person (except any duly chosen and sworn as aforesaid) shall print any of the said things, matters, and businesses, concerning the Royal Society aforesaid, they, the said JOHN MARTYN and JAMES ALLESTRY, duly observing all the orders and directions of the president and council. or he said seven or more of them aforesaid, concerning the printing of all the said matters and businesses. In witness whereof, we have caused our common seal to be affixed unto these presents, and the same to be signed by the president of the Royal

* Original Register, vol. ii. p. 316. It is printed, with Mr. BOYLE's Experiments and considerations concerning colours, at London, 1663, in 8vo.

"Society aforefaid, this thirteenth day of January, in the fifteenth year of our sovereign lord CHARLES the second, by the grace of GOD, of England, Scotland, France, and Ireland, king, defender of the faith, &c. *annoque Domini 1663.*"

It was ordered, that the operator desire Mr. MARTYN and Mr. ALLESTRY to attend the Council on the Monday following, to receive their commission, and to hear the statutes concerning their duty, and to be sworn as printers to the Society; they having no exception against such commission and statutes.

The statute of the duty of the printers, as also the statute of a certain number of printed copies to be presented by the printers of the Society, both passed the first time.

November 4. At the meeting of the Society,
The earl of ARGYLE was admitted.

Mr. THOMAS COX was elected.

The statutes of the Society were published.

Dr. WILKINS presented the Society with several things for their repository :
1. A wind-gun. 2. A burning-glass, in a brass frame. 3. Another burning-glass, in a wooden frame. 4. Scales for weighing of gold without any counterpoise. 5. A strange bone, with a rib in the middle. 6. A geometrical arch, composed of many small pieces of wood, without any nails or pins. 7. A loadstone, then in the hands of Sir WILLIAM PERSALL, and ordered to be called for by the operator. 8. A large concave metal. 9. A cylinder metal. 10. An angular metal. 11. A blue concave glass. 12. A piece of petrified wood. 13. A cocoa-nut. 14. An ostrich's egg-shell. 15. A piece of perspective. 16. Two papers of petrified glass. The operator was ordered to fit the wind-gun, and to polish and varnish the burning-glass. The presenter of these things received the thanks of the Society; and it was ordered, that he be registered as a Benefactor; together with prince RUPERT, for his water-engine; the bishop of Exeter, for his pendulum-clock; Mr. BOYLE, for his pneumatic-engine; Sir HENRICH FINCH, solicitor-general, for remitting the fees due to him for the Society's charter; and Dr. BATE, for a present of ten pounds.

The history of whale-fishing, and of the making of whale-oil, was delivered in by the secretary from Mr. GRAY of the Greenland company, who had been in those parts, and present at the killing of whales and the making of oil a dozen times; and was ordered to be registered, as follows :

"We have, according to the bigness or smallness of our ships, the more or fewer boats : a ship of 200 tons may man six boats; a vessel of 80 or 100 tons, four

P Dr. SEYMOUR WARD

Original Register, vol. ii. p. 308.

"boats ;

“ boats ; a vessel of 60 tuns, three boats, or more, not less ; three boats being as few as may be with convenience to kill a whale. Each boat hath six men, a harpioneer, a steerfman, and four oars ; to which men the merchant giveth (besides their wages) for every thirteen tuns of oil (which we call a whale) when there is so much for each boat, to the harpioneer 6*l.* 10*s.* the steerfman 3*l.* and to each oar 1*l.* 10*s.* in all for each boat 15*l.* 10*s.* which we call whale-money.

“ We have several men and boats upon several convenient places, which we call *Look-outs*, that constantly remain looking out by turns for the whale, which, when we fish in harbour, cometh into a smooth bay, where is a good harbour for our ships : and having discovered the whale, which swimmeth with her back above water, or is descried by the water, which she bloweth into the air, one look-out maketh signs to another by hoisting up a basket upon a pole, and then all the boats row after her ; and having opportunity to row up with her, before she goweth down, strike a harping-iron into her, to which is a staff joined, being about six foot long, called a harping-staff, to the socket of which iron is a white rope, with an eye seized very fast. This rope is about five fathom long, lying upon the fore-part of the boat (which we call a shallop) always coiled over a little pin, ready to take up, to give scope to the iron, when it is thrown at the whale ; and to this hand-rope is a warp of 300 fathoms seized, to veer after the whale, lest, when she is struck, by her swift motion (which is often down to the ground, where the water is 60, 70, or 80 fathom deep) she should sink the boat.

“ Thus having gotten one iron into her, our boats row where they think she will rise (after she hath been beating herself at ground) and get two or three irons more into her, and then we account her secure. Then when she is near tired with striving, and wearied with the boats and ropes, we lance her with long lances, the irons and staves whereof are about twelve or fourteen foot long, with which we prick her to death ; and in killing her, many times she staveth some of our boats, beating and flourishing with her tail above water, that the boats dare scarce come nigh her ; but oftentimes in an hour's time she is dispatched.

“ Thus having killed her, our boats tow her (all of them rowing one before another, one fast to another like a team of horses) to the ship's stern, where, after she hath lain twenty four hours, we cut off the blubber, and take the fins (which we commonly call the whale-bone) and her tongue out of her mouth, and with a great pair of slings and tackle we turn her round, and take all that is good off her, and then we turn her carcass a-drift, and tow the blubber (cut in pieces) to the shore, where works stand to manure it.

“ Having made fast the blubber to the shore, we have a water side-man, who stands in a pair of boots to the middle leg in water, and flaweth such flesh as is not clean cut from the blubber. Then we have two men with a barrow, that, when the water-side man hath cut it in pieces of about two hundred weight, carry it up to a stage standing by our works like a table ; then we have a man with a
“ long

long knife, who we call a stage-cutter, who sliceth it into thin pieces about half an inch thick, and a foot long, or longer, and throws it into a cooler we call a slicing-cooler, betwixt which and another cooler (called a chopping cooler) we have men we call choppers placed; five or six men, who upon blocks cut about a foot and an half square (made of the tail of the whale, which is very tough) do take the sliced blubber and chop it very small and thin, not above a quarter of an inch thick, and an inch or two long, and thrust it off from their blocks into the chopping-cooler, which holds two or three tuns. Then upon a plat-form is built a copper-hole about four foot high, to which there is a stoke-hole, and on this copper-hole is a broad copper, which containeth about a butt, hanged with mortar and made tight round the edges. And over the stoke-hole, upon an arch, stands a chimney, which draws up the smoak an flamed. And we have one we call a tub-filler, who with a ladle of copper, whose handle is about six foot long, taketh the chopt blubber out of the chopping-cooler, and puts it into a hogthead made with straps for that purpose; and he draws this hogthead from the chopping cooler's side to the copper, and putteth it in; under which having once kindled a fire of wood, and boiled a copper or two of oil, the scarf, which remains after the oil is boiled out of the blubber (which we call fritters) we throw under the copper, which makes a fierce fire, and so boileth the oil out of the blubber without any other fuel.

"Then when we find that it is boiled enough, we have two men, whom we call copper-men, who with two long-handled copper-ladles take both oil and fritters out of the copper, about half, and put it into a barrow (we call a fritter-barrow) made with two handles, and barrel-boards set about half a quarter of an inch one from the other, through which the oil runneth and the fritters remain; from which the oil being drained, whilst another copper of oil boils, they are cast into the stoke-hole and burnt, and the barrow stands ready again on the first oil-cooler, to receive what is taken out of the next copper. Out of this barrow the oil runs into a great thing we call a cooler, made of deal-boards, containing about five tuns, which is filled within an inch of a hole (made in the side for the oil to run into the next spout) with water to cool the oil, and so the oil runs upon the water through this hole into a spout about ten or twelve foot long, into another cooler filled as aforesaid, and out of that through a long spout into a third filled as aforesaid, and out of that in a long spout into a butt laid under the end of this spout; which being full, the hole of the cooler next the butt is stoppt till another butt is laid under, and then the plug being taken out it filleth another, till we have done boiling. Then we fill up our oils, when they are thoroughly cold, and mark them and roll them into the water, rafting twenty together, and so tow them aboard, hoist them into our ships, and stow them to bring them home.

"And for our fins, which grow in two guns in the whale's mouth (whereof in a whale's mouth, great and small, are about 600, 460 whereof being merchantable) we cut them one by one out of the gums, and having rubbed them clean, we bind them up sixty in a bundle, and so taking account of them, ship them aboard in our long boat.

"Upon

" Upon the shore we have a tent for our land-men, built of stone, and covered with deals, and cabbins made therein for our blubbermen to lodge; and we have a great working tent with a lodging-room over it, where about six coopers work, to get ready casks to put the oil into."

SIR ROBERT MORAY moving, that it might be considered, whether there might not be devised an engine fit to strike the whales with more ease and sureness, and at a greater distance than those now in use, it was ordered, that Dr. WILKINS and Mr. HOOKE should think of such an engine, that might be cheap and easy to be managed.

Mr. HOOKE shewed some microscopical observations of, 1. A mite. 2. Sparks of a flint. 3. Hairs of a man's head, of a cat, and of a horse, and some bristles.

Mr. HOWARD mentioned something of the care taken by him for the propagating of saffron, and of several observations made by him concerning it; desiring, that some members of the society might be joined with him for the prosecution of this work. Whereupon Mr. BOYLE, Mr. EVELYN, and Mr. HENSHAW were desired to do so, and himself was requested to communicate his notes aforesaid to the society.

Mr. BOYLE suggested, that the oil of turpentine or spirit of wine was good to keep birds, and the first better than the second for that purpose.

Dr. CROUNE communicated a letter written to him by Mr. NEWBURGH, and dated October 31, 1663, about the fertilising of barren orchards by turning cattle into them, and foddering them all the winter. An extract of this letter was ordered to be entered¹, as follows:

" I cannot let pass one experiment newly made by a person of quality in Hampshire, for the fertilising of his orchard, which, after near thirty years barrenness, was suddenly made wonderously (it is said constantly) fruitful. About four or five years since there came to his house an honest plain man, who observing a great orchard well filled with handsome trees, in a manner totally fruitless (for, as I remember, out of four acres of ground set with fruit-trees, set at twelve or fourteen feet distance, he never made an hoghead of cider till within these two last years) he was persuaded by him, after fruitless trial of all other remedies, to turn his cattle into the orchard, and to fodder them there all the winter: which advice neglecting for some years, upon a second mention by another hand, the winter immediately preceding the last, he made his first trial of it, which sped so well, that in that great bearing year he made above twenty hogheads of cider, reserving a great quantity for hoard. Doing the same last winter, his success was again so nearly answerable to the former, that when I was there, he had made already above eighteen hogheads, and conceives (though he finds this generally a failing year) he had more apples for number this year than the former; only so much smaller, that they did not fill the bushel as before."

¹ Letter-book, vol. i. p. 93.

Dr.

Dr. WALLIS was desired to prosecute the observations of the satellites of Jupiter begun by Mr. ROOKE.

Mr. HOOKE was desired to try the new founding balls in the Thames for major HOLMES, and to give an account of the success to the society.

Mr. BOYLE acquainted the society, that he had made more observations with Mr. CLAYTON's diamond, which he intended to add to the former; and that, among the rest, he had caused some coruscations in it by pricking it with a bodkin.

Dr. CHARLETON made the experiment of grafting a cock's spur upon a cock's comb; and was desired to take care of the success, and to give an account of it in writing.

The operator was ordered again to provide another dog for Dr. CHARLETON to cut off a piece of his skin, and to sew it on again.

November 9. At the COUNCIL were present

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| The lord viscount BOUNCKER, | Mr. HENSHAW. |
| president. | Dr. WILKINS. |
| Sir ROBERT MORAY. | Dr. GODDARD. |
| Sir PAUL NEILE. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |

It was ordered, that the amanuensis make a list of all the fellows of the society, without the members of the council, in four columns, and another of all the members of the council in a column by themselves; and that he deliver them to the printer of the society to be printed accordingly.

It was likewise ordered, that the summons for the anniversary election should be issued in the manner following:

“ These are to give notice, that on Monday the 30th day of this instant November, 1663, being St. ANDREW's day, the council and officers of the Royal Society are to be elected for the year ensuing; at which election your presence is expected at Gresham-College, at nine of the clock in the forenoon precisely.

“ BOUNCKER, P. R. S.”

JOHN MARTYN and JAMES ALLESTRY had the commission of establishing them printers to the society, as also the two statutes concerning the duty of printers, delivered to them, to consider thereof. They having withdrawn for that purpose, and upon consideration having no exception to any thing contained in the said commission and statutes, were sworn printers to the society.

The

The statute of the duty of the printers, and the statute of a certain number of printed copies to be presented by the printers of the society, both passed the second time.

November 11. At a meeting of the Society

MR. FRANCIS POTTER and Mr. THOMAS COXE were admitted.

The following persons were voted by ballot a committee to examine, according to statute, the treasurer's accounts, Sir ANTHONY MORGAN, Dr. WALLIS, Mr. COLLWALL, Mr. AUBREY, and Mr. HOSKYNs: and it was ordered, that they, or any three or more of them, should meet for this purpose at Sir ANTHONY MORGAN's lodgings on the Saturday following, the 14th instant, at three of the clock in the afternoon, and to bring in their report a fortnight after, being the 25th of November, at the ordinary meeting of the society.

Mr. GOMELDON the elder was elected into the society.

Sir ROBERT MORAY presented from prince RUPERT to the society an instrument of his highness's invention for casting any platform into perspective. It was ordered, that the President, Sir ROBERT MORAY, Mr. AERSRINE, Dr. WILKINS, Dr. WALLIS, Dr. GODDARD, and Mr. OLDENBURG wait upon the prince on the Friday following, the 13th instant, and return him the humble thanks of the society; and to shew him an instrument of Dr. WREN's invention for casting any natural object into perspective.

Mr. HOOKE suggesting, that additions might be made to the said invention of prince RUPERT, so that it might incline and recline, and be fitted to draw likewise solid bodies in perspective, and to describe all kind of dials, was desired to bring in these additions in writings, and then to give a description, and to shew the practice of the whole. In the mean time it was ordered, that the prince's instrument should remain simple, as it was then, without any alteration therein.

Mr. CLAYTON's diamond being again spoken of, the president mentioned, that he had one upon his finger, which being without clouds, would shine notwithstanding, when rubbed in the dark. Mr. HOOKE added, that he had a ring with six small diamonds, which would all do the like, but continue for a very little time. And Mr. BOYLE related, that he was credibly informed of a certain stone brought by an admiral of the Dutch fleet from the East-Indies in a chest, which stone shone so, when the chest was opened in the dark, that by it they could see all that was therein besides. Sir ANTHONY MORGAN spoke concerning cliffs in Scotland, which, by the relation of many persons, on their west side, would give a great light in the dark. This was confirmed by Sir ROBERT MORAY, who was desired to make a more particular inquiry into it, which he undertook to do.

Sir ROBERT MORAY mentioned, that prince MAURICE of Nassau had a considerable shining stone; and Mr. POVEY was desired to write into Holland for the favour of a particular information concerning it; which he promised to do.

VOL. I.

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Mention

Mention was also made of the Bononian stone, concerning which Mr. BOYLE affirmed, that, if it were very good, it would shine without the sun by a candle, or in a cloudy day. He moved also the making a trial, whether the Bononian stone might be made to shine without calcining it. Mr. HENSHAW mentioning, that he had one, which had once the quality of shining, but lost it; it was queried, whether a way might not be found to recover that quality; that gentleman affirming, that rotten wood, which had shined, would, upon its being exposed to the fire, and growing dry, lose its shining quality, but after two or three days regain it. Sir ROBERT MORAY queried what degree of putrefaction made fish or wood shine? Mr. BOYLE conjectured, that the shining of those bodies, and the loss of their shining, depended upon a slight change of their texture.

Mr. CLAYTON promised to bring some of the Bononian stone to the next meeting.

Dr. WILKINS moved, that a collection might be made of all such bodies as shine in the dark; and Mr. BOYLE having remarked, that he had some such collection amongst his writings, was desired to communicate it to the society, and to consider the cause of this phenomenon.

Dr. WILKINS produced an instrument and paper of Dr. POWER, representing and describing the Copernican motion of the sun upon its axis, &c. They were both delivered to the operator, to put the instrument into order, and it was referred to Mr. HOOKE to see, whether it would answer the intention.

Sir ROBERT MORAY mentioned a new way of carriage invented in France by the duke of ROANEZ, for riding with much ease as swift as a post over all kinds of ground, without concussion or danger of falling; and that the inventor was now taking out a patent for it. This occasioned Mr. HOOKE to present to the society a scheme of an instrument to walk in upon the land or water, with swiftness, after the manner of the wheel of a crane. Several objections being made to this proposition, it was judged proper, that it should be farther considered; and if, upon second thoughts, it was conceived probable for success, a model should be made of it.

Mr. HOOKE shewed the scheme of another engine for carriage, viz. of such a one, as goes with one wheel, and is drawn by one horse, so contrived, that it shall not fall, but be kept perpendicular, what way soever it moves, even on the declivity of a hill, &c. He was desired to have a model made thereof.

He being asked, whether he had tried his new sounding balls for major HOLMES, said, that he had tried them, and found them to do exceeding well. Oozy ground was observed to be most likely to make them unsuccessful.

Mr. POVEY mentioned, that Mr. JONAS MOORE had an engine for slaying two or three hours under water in; and likewise a method of blowing up great rocks; both practised by him at Tangier. The proposer was desired to bring either the artill to the society, or a description of these two practices in writing; which he promised to do.

Mr.

Mr. Hooke spoke of a way of carrying air down to the bottom of the sea at any depth, and of bringing it up, under a bell. He was desir'd to give in a particular description of it.

Sir ROBERT MORAY mentioned a new use to be made of thermometers, *viz.* to know by their help the degrees of heat in a man's body in fevers, &c. by putting it into a man's hand, or mouth, or urine, &c. The physicians present conceived, that there would be little certainty in it.

He acquainted the society, that major HOLMES was again charged with the two pendulum clocks in his voyage to the West-Indies, to try them the second time, for an exact measure of time. as also, that the sounding-balls mentioned above were committed to him to make trial with.

Mr. BOYLE produced some vitriol, which he had made of the ore put into his hands by Sir ROBERT MORAY, at the desire of the society; and he affirmed, that he had made it shoot very well into this copperas, without any addition at all. It was well coloured, and thought not inferior to Dantzick vitriol. It coloured a knife.

Sir ROBERT MORAY was desir'd to procure more of the same mineral for farther trial; which he promised to do from Col. LONG.

Dr. GODDARD mentioned, that he had dissolved manna in fair water, and found it shoot into very fine crystals.

Mr. BOYLE said, that he had dissolved ambergrise, and made it crystalize in very curious figures.

Mr. Hooke was appointed to provide a good experiment in the compressing engine against the next meeting.

The operator was ordered to have a dog ready for the next meeting, to cut off a piece of his skin. The curators appointed for this were Dr. CROWE and Mr. Hooke.

November, 16. At a meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. ENT. |
| Sir PAUL NEILE. | Dr. CLARKE. |
| Mr. SLINGESBY. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. BALLE. | Mr. OLDENBURG. |
| Mr. HENSHAW. | |

It was ordered, that Mr. BALLE acquaint Sir WILLIAM PERSALL, that Dr. WILKINS had presented his load-stone, now in the hands of Sir WILLIAM, to the society.

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and require him in the name of the council to deliver it to him for the use of the society.

Mr. HILL brought in the inventory, drawn out of the treasurer's bills, of the things belonging to the society; which inventory was ordered to be delivered by the secretary to Mr. HOOKE, as keeper of the repository.

Dr. GODDARD also brought in a list of the things committed to his custody, which list was also ordered to be delivered to Mr. HOOKE.

November 18. At the meeting of the SOCIETY, Monsieur DE BRUIN, of Antwerp, who had lived many years in England, skilful in jewels and metals, had, upon the motion of Mr. OLDENBURG, the leave of the society to be present at this meeting.

HENRY earl of PETERBOROUGH was proposed by the president, and immediately chosen and admitted into the society.

Dr. WILLIS was elected, having been forgotten to be chosen, at the time when, upon the renewal of the charter, the council, according to the power granted them therein, received and admitted into the society such persons, as had been elected fellows before upon the first charter.

Mr. GOMELDON the elder was admitted.

Mr. PALMER presented the society with a very artificial gun of CASPAR CALTHOF's contrivance, lodging at a time seven bullets and powder in proportion, and discharging them at seven several times. He had the thanks of the society; and it was ordered, that he should be registered amongst their benefactors.

Sir ROBERT MORAY mentioned, that prince RUPERT had contrived a gun exceeding all that had hitherto been invented of that kind, discharging several bullets with ease and without danger.

The account of the observations made in the glass canes with water of forty feet long, was brought in by the operator, and ordered to be kept till the president had brought in his account of the mercurial observations, and that then both be compared and digested, and all registered.

The president was desired to prosecute the experiments both of the suspension of the mercury above its usual height, and of the variations of its station, according to the changes of the air.

Mr. HOOKE shewed the society his model for the whale-shooting engine. Some objections being made concerning it, it was ordered, that Dr. WILKINS, Dr. WALLIS, and Mr. HOOKE should meet together on the Tuesday following, in the afternoon, to consider farther of it.

Mr.

Mr. HOOKE was put in mind to bring to the next meeting his additions to prince RUPERT's instrument of perspective, and to make a full description of it.

He was also ordered to make a paste-board model of his engine with one wheel, to travel in with ease and speed, and to shew it to the council at their next meeting; as also to prepare a model of his other engine, to travel in over land and water by walking in it, after the fashion of the wheel of a crane.

Sir ROBERT MORAY was desired to request prince RUPERT to send his powder-tryer with a loose and fixed ferrel to the society, to try his experiments of the force of powder therein.

Mr. GOMELDON promised to shew the society a diamond like that of Mr. CLAYTON's, but not shining in the dark upon being rubbed.

Dr. WILKINS, Dr. ENT, and Mr. HENSHAW were appointed curators for the recovery of the shining quality of a Bononian stone.

Sir ROBERT MORAY related, that he had spoken with the lady REAY concerning the shining cliffs in a little isle in Scotland; and that she told him, that her father and others of the family had heretofore often seen it, and had sometimes shot at it with chalk to mark the shining place; but could never find the mark in the day-time after: that for twenty years she had heard nothing of it; but she would now make more particular inquiry after it, she being shortly to go to Scotland herself.

November 23. At the meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. ENT. |
| Sir PAUL NEILE. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. HILL. |
| Mr. HENSHAW. | Mr. OLDENBURG. |
| Mr. BALLE. | |

Mr. SYMMONDS brought in the manual seal, containing the crest of the arms of the society.

Dr. GODDARD had this seal delivered to him.

It was ordered, that the treasurer pay to Mr. SYMMONDS the sum of twenty-five pounds in full of his bill for both the seals of the society, and the other particulars contained in that bill.

Mr. HOOKE produced a model of a new way of carriage with one horse, after the fashion of a wheel-barrow, devised by himself; and upon some debate it was ordered, that he should farther consider of it against the next meeting of the council.

November

November 25. At the meeting of the SOCIETY,

Mr. HOOKE brought in an account of his additions to prince RUPERT's perspective engine; and it was ordered, that such an engine should be made for the use of the society.

The committee formerly appointed to meet for the examining of the treasurer's accounts, but not being yet ready for a report, was desired to meet the next day at three o'clock in the afternoon at Mr. BALLE's lodgings, and to make a report on the Monday following, before the society should begin the election of a new council.

Mr. HOOKE acquainted the society, that he had altered his thoughts about the whale-killing engine, conceiving now, that a cross-bow of whale-bones might be so contrived, as to perform that execution well. Whereupon some of the members objecting, that whale bones would by the water lose their spring, it was said, that good varnish would secure the spring. Others suggested, that a bow of steel tunned over would do well, especially if several thin steel springs were put together. Mr. HOOKE was desired to consider farther of this.

Dr. CHARLETON mentioning a peculiar kind of bow, which he thought might be had in Grub-street, was desired to inquire after it, and to obtain the sight of it for the society; which he promised to do.

The president acquainted the society, that he had received a letter sent to a minister in England from a suffragan bishop in Iceland; which letter being produced, the secretary was ordered to peruse it, and give an account of it to the society at their next meeting; against which time the amanuensis was ordered to make a copy of the inquiries formerly drawn up by Mr. HOOKE and sent to Iceland, in order that they might be considered of, and fitted by the president to be sent and recommended to the said bishop, as a person conceived to be capable and curious enough to return a proper answer to them.

The operator was appointed to rectify the thermometers, and to have one as a standard to adjust others by.

Dr. WALLIS related the observations of a certain farmer concerning the weather, made by him for several years; whereby he had found, that the weather falling into a certain course at such and such a time of the moon in certain seasons of the year, and chiefly about the equinoxes, it would for many subsequent months return to the like course at the same time of the moon, and for the most part not alter considerably therein during those days till the next equinox.

Sir PAUL NEILE mentioned, that he had observed, that the neap-tides were accompanied with the driest, and the spring-tides with the wettest weather.

Mr. PALMER added, that watermen would prognosticate rainy weather approaching, by a more than ordinary drinels in their hands.

• January 21, 1663.

Mr.

Mr. HOOKE produced his engine for determining the force of powder by weight: but it being found imperfect, by reason of the non-continuance of the first impulse, he offered to complete it, by the addition of a rammer.

Sir ROBERT MORAY promising to procure, for the next meeting, prince RUPERT's powder-tryer, the operator was ordered to provide several sorts of powder for pistols, muskets, and cannon; and to make trial with all of them in the said tryer.

Sir PAUL NEILE mentioned, that trial being made of prince RUPERT's powder, and common English powder, it was found, that whereas a charge of the English powder shot through three boards, and stuck in the fourth, prince RUPERT's powder passed through four boards, and stuck in the fifth.

Dr. CHARLETON promised to bring some of prince RUPERT's powder.

Mr. HENSHAW produced his Bononian stone, which had shined formerly, but now lost that quality. He delivered it to Mr. BOYLE, to see whether he could recover its shining faculty.

Mr. BOYLE mentioned, that he had tried with spirit of wine, to draw out of putrefied fish its shining virtue, but without success; but that he had done it with oil of vitriol with present success, this oil having the power of altering the texture of that substance.

The experiment of cutting off a piece of a dog's skin was ordered to be deferred till a warmer season.

The operator gave an account, that the old spur put on the cock's head was fallen off; but that the young spur, put on within the skin, and covered therewith, proved firm, and grew.

Mr. POVEY being called upon for Mr. JONAS MOORE's way of breaking rocks with powder, Sir ROBERT MORAY related, from prince RUPERT, the following way of blowing up rocks under-ground in mines, viz. by making a round hole in the rock eight or ten inches deep, or as deep as they can; and then, by taking two wedges, which put together make a cylinder diagonally cut, and by thrusting in the great end (after the powder is put in) and then by driving in the other end: which done, and fire being given to the powder by a train made in a groove in the wedges, the rocks are broken, because the wedges cannot be thrust out.

Mr. HOOKE shewed a microscopical observation of a silk-worm's egg.

The following experiments were appointed for the next meeting: 1. Of powder in prince RUPERT's tryer. 2. Of the wind-gun. 3. Of the compressing-engine.

November 30. This being the anniversary election-day of a new COUNCIL for the year ensuing, the Society met in a solemn manner.

First, according to a former order, Sir ANTHONY MORGAN, in the name of the committee appointed for that purpose, made a report concerning the treasurer's accounts, as follows:

November 26, 1663.

At a committee for examining and auditing the accounts of the treasurer of the ROYAL SOCIETY of London, &c. in pursuance of their order, dated Nov. 11, 1663,

It appears, that from the 28th Nov. 1660, until the 11th Sept. 1663, } *l. s. d.*
there is due to the Society, by the subscriptions of their members } 685 11 0

| | |
|---|-----------------|
| | <i>l. s. d.</i> |
| Of which hath been received by the treasurer - - - | 527 6 6 |
| And there remains in arrears - - - | 158 4 6 |
| Disburied by the treasurer, according to order of the Society - - - | 479 11 9 |
| So there remains in the treasurer's hands - - - | 47 14 9 |
| Arrears unpaid by the members - - - | 158 4 6 |
| In all - - - | 205 19 3 |

| | | |
|------------------------------|--------------|---------------|
| Examined and approved by us, | | |
| ANT. MORGAN. | JOHN WALLIS. | JOHN HOSKYNs. |
| DAN. COLWAL. | | JOHN AUBREY. |

This being done, the Society proceeded, according to their charter, to the election of the COUNCIL and officers for the year ensuing, observing the orders prescribed for that purpose in their statutes; there being present fifty-seven or fifty-eight fellows.

Of the old COUNCIL were continued the following eleven:

| | |
|------------------------------|----------------|
| The lord viscount Brouncker. | Dr. WILKINS. |
| Mr. BOYLE. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Sir PAUL NEILE. | Mr. HILL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Mr. BALLE. | |

The ten new ones elected were:

| | |
|----------------------------|---------------|
| The marquis of DORCHESTER. | Mr. COLWAL. |
| The lord BERKLEY. | Mr. POVEY. |
| Mr. CHARLES HOWARD. | Dr. MERRET. |
| Sir ANTHONY MORGAN. | Dr. WHISTLER. |
| Sir PETER WYCHE. | Mr. HOSKYNs. |

Out

Out of this new COUNCIL were elected for officers

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | president. |
| Mr. Hill, | treasurer. |
| Dr. Wilkins, | } secretaries. |
| Mr. Oldenburg, | |

Of the ten new members of the COUNCIL were sworn by the president

| | |
|---------------------|---------------|
| Mr. Howard. | Dr. Merret. |
| Sir Anthony Morgan. | Dr. Whistler. |
| Sir Peter Wyche. | Mr. Hoskyns. |
| Mr. Colwall. | |

Mr. Hill was sworn treasurer.

December 2. Mr. Colwall presented the Society with fifty pounds, making it withal his request, to be permitted to continue his weekly payments, from the obligation of which the statute concerning benefactors discharges all such fellows, as shall present to the Society such a sum of money. He had their public thanks for this liberality; and it was ordered, that he should be recorded as a benefactor to the Society, with the expression of his desire not to be exempted from the ordinary payments for the future.

Dr. Wilkins acquainted the Society, that he had received an answer from Dr. Christopher Wren, concerning his promised weather-cock, together with the scheme thereof. The amanuensis was ordered to draw the scheme in great against the next meeting, at which it should be considered, together with the letter describing it.

Mr. Hooke informed the Society, that he had spoke to Mr. Thompson, to make prince Rupert's perspective-instrument, together with his additions.

The operator was put in mind, of rectifying the thermometer's standard against the next meeting.

Mr. Boyle desired, that observations might be made, whether sometimes the weather does not appear more cold by the thermometer than to men. Some of the Society affirmed it to do so, and in particular, that in cold dry weather, the thermometer would be more affected than men; but in cold moist weather, the contrary. It was moved, that in making the observations, care should be had to inquire, whether this difference be found by others, as well as the members of the Society.

Mr. Boyle desired also, that inquiry might be made, whether there be not greater degrees of cold than is necessary to glaciation? And whether water turned into ice may not be advanced to a greater degree of cold? As also, whether there may not be certain things, that may produce the same effects, that cold doth, in

Vol. I.

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some bodies, which they will not produce in others, though they may seem as susceptible, as the former, of the actions of heat and cold.

Dr. WILKINS moved, that the air might be drawn out of rectified spirit of wine, in order to put such exhausted spirit into a thermometer, to observe the actions of heat and cold upon it. Dr. GODDARD was desired to be curator of this experiment, who conceived, that the whole liquor was likely to be exhausted.

Sir ROBERT MORAY produced prince RUPERT's powder-tryers, to try in them the difference of the force of several powders: and the experiments being made, it was found, that the common powder, with the fixed ferrel, raised the weight very little; whereas the same quantity of the prince's powder, with the loose ferrel, struck it up to the top with some return. Again, that the prince's powder, the ferrel being firm, raised the weight to three quarters of the whole; the common powder, but to two notches: but without the ferrel, the prince's powder raised it to half the height and more; the common powder as before.

The prince's powder having double the effect in the tryer with a long ferrel, to what it had with a fixed ferrel, it was referred to the president, to consider of the reason of it. The same kind of powder being found to differ in strength from the common English powder as about eleven to one, Sir ROBERT MORAY moved, that it might be considered, how to make such powder in England, since it might be carried in far less quantity to perform the same effects, that ordinary powder doth; and the charges of making it would not be so great, as to take away the advantages of it.

Sir ROBERT MORAY offered his service, in desiring prince RUPERT to prosecute these experiments, by putting loose ferrels into guns.

Mr. POVEY mentioned, that powder sent to the Indies lost its virtue. Mr. HENSHAW offered this for a reason of it, that the air there being very moist, did by relaxing the salt of it spoil its strength, though by working it up again its goodness was recovered.

The operator was ordered to make such powder-tryers as those of prince RUPERT; as also the little instrument, by which that prince made small screws with very great dispatch.

The operator was directed also to try the experiment in Mr. HOOKE's new powder-engine by himself, and then to do it before the Society at their next meeting.

Mr. POVEY mentioned a spring of his, sinking at Michaelmas, and beginning to rise again after Christmas, and continuing to rise till about April, at which time it came to its fulness again. He added, that springs were observed to bubble up at Salisbury about April.

Mr.

Mr. HOSKYNs mentioned a spring at Barnely in Gloucestershire, that rose against fair, and sunk against foul weather; as also, that the diggers for wells, if they find water any where between Michaelmas and Allhallontide, conclude, that the water never fails in such places.

Mr. BOYLE moved, that Mr. POVEY, Mr. HOSKYNs, and others, who could, might bring in their collections of observations concerning springs.

Dr. WILKINS related, that he had heard Col. BIRCH affirm, that he had an artificial spring made on the side of a hill, by digging a trench, and throwing store of pebble-stones into it, and covering it with earth; which having a quick fall of rain-water, would furnish the trench with water, not only whilst the rain-water lasted, but a long time after the rain was past.

Mr. BALÉE remarked, that springs are often made on the sides or bottoms of hills, by giving vents for water that is there; whereas the preceding story seems to speak of springs made by trenches where no spring-water is; the like whercof, the lord BACON records in his *Natural History* ¹.

Dr. WILKINS observed, that Dr. ENT had made considerable observations about springs. He was desired to speak to Dr. ENT to communicate them to the Society.

Sir ROBERT MORAY mentioned a coal-pit belonging to the earl of KINCARDIN's grandfather, within a mile of Calros in Scotland, lying within the high-water-mark, about half a mile from the shore, where the sea flows upright over the place where the mouth of the pit was, 15 or 16 foot. Here was a great round of stone of 100 foot diameter or more, raised higher than the high-water, and so filled and strengthened with clay, that the water could not pierce it, wherein a hole was left in the middle for digging of the pit. The pit went down into a rock many fathoms under the sea, till they found the vein of coals, which was digged out, for a great many years together yielding very good coal; so that there were great vault caverns made under the sea, out of which the coal had been wrought. The water, which the coal afforded, was drawn up by a mill, situated upon the brink of the shore. This mill was turned by water, conveyed about half a mile from a convenient height in spouts of wood, which, at the pit's mouth where the wheel was turned, was raised about 30 foot, and turned a wheel of about 24 foot diameter. The pit, out of which the water was drawn, was 40 fathom deep: it was digged till either it was emptied of coal, or the sea by some accident drowned it, about 20 or 25 before. The place, where the pit was within the sea-mark, out of which the coal was digged and brought, was made where it was dry at low-water; and ships of good burthen laid their sides to it at high-water, and so took in the coals. The water drawn out of the pit upon the shore was fresh water, to Sir ROBERT's best remembrance.

¹ Century i. n^o 25. p. 6. 9th edit. London, 1670. fol.

Mr. HOWARD's account of saffron was read; and upon his mentioning some additions, which he had ready to join to this paper, was desired to communicate them likewise.

He promised to produce before the Society the kiln and other instruments employed for the ordering of saffron.

Sir ELLIS LEIGHTON was proposed candidate by Sir ROBERT MORAY.

The experiments appointed for the next meeting were, one in the compressing-engine, and another in the new powder-engine.

December 7. The new COUNCIL met the first time, at which were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| LORD BERKLEY. | Mr. PALMER. |
| MR. CHARLES HOWARD. | Mr. HILL. |
| Sir ROBERT MORAY. | Dr. MERRET. |
| Sir PAUL NEILE. | Dr. WHISTLER. |
| Sir PETER WYCHE. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. HOSKYNs. |
| Mr. POVEY. | Mr. OLDENBURG. |
| Mr. BALLE. | |

The lord BERKLEY and Mr. POVEY were sworn members of the COUNCIL; the other eight new members having been sworn upon the anniversary election-day.

Upon debate, whether the eleven continued of the old Council should be new sworn, the COUNCIL, after mature consideration of the words of the charter concerning this point, was satisfied, that they were not to be sworn anew; but the two secretaries, elected again for another year, were judged to be obliged by the words of the charter to renew their oath, which they did accordingly.

It was ordered, that the president, Sir ANTHONY MORGAN, Mr. HILL, Mr. COLWALL, and one of the secretaries, or any three or more of them (whereof the president and one of the secretaries to be two) be a committee for examining the accounts of Mr. BALLE, the late treasurer, from Midsummer to St. Andrew's-day.

The motion of providing experiments for his majesty's reception being renewed, and consideration being had of the necessity to appoint a person for the careful preparing thereof, it was voted, that Mr. Hooke should be invited to lodge in Gresham-college four days in the week, viz. Mondays, Tuesdays, Wednesdays, and Thursdays; and that a convenient lodging should be provided for him, and he allowed twenty shillings a week for that time. Mr. Hooke was called in thereupon, and this proposition being made to him, he accepted of it.

It was ordered, that Mr. HOOKE attend the COUNCIL every Monday, with an account of the success of the experiments to be prepared for his majesty's entertainment :

That the experiments, to be made on Wednesdays at the ordinary meetings of the SOCIETY, be considered of by the COUNCIL on Mondays, whether they were fit and ready ; as also, that some considerable experiments be had in reserve for extraordinary occasions : And

That Dr. MERRET, Dr. WHISTLER, and Mr. HOSKYNs, peruse the books of the Society, wherein the experiments and other philosophical matters, treated of at their meetings, are recorded ; together with their journal-books ; and consider, which relate to and depend upon one another ; as also, wherein they may be defective, and how farther to be prosecuted.

December 9. At the meeting of the SOCIETY,

Dr. WREN's description of his weather-clock, consisting of two wings, that may be added to a pendulum-clock, was read, and ordered to be registered, together with the scheme of it*, as follows :

" Upon the index-wheel of the clock, within the plate, is fixed the little wheel
 " A, which moves the rack B, annexed by the joint C, to the crooked piece H,
 " C, D, E, G, which being made thin and light, passeth through the basis of
 " the clock at D and E, and through slits in the pillars of the outward frame F,
 " G ; at the end it holds two black-lead pencils, upon the points of which (and
 " not in the slits) the crooked piece depends. The pencil H rests and draws
 " lines on the cylindrical substance of the turnbrel K, which is the weather-wheel,
 " moved by quicksilver after the manner I have formerly shewn. The pencil I
 " resteth on the flat of the wind-wheel L, moved by a vane without. On both
 " surfaces are described circular lines for the hours, according to the motion of
 " the rack, and cross to them strait lines, shewing degrees of weather in the one,
 " and rums in the other : amongst these permanent lines the pencils describe irregular
 " lines, compounded of the motions of the rack and wheels, much like
 " the motion of the ship described among the longitudes and latitudes of the
 " chart : and from these tracks of the pencils may be collected the changes of
 " wind and weather, that have been in the twelve hours last past.

" These surfaces may be printed papers slightly stuck on with mouth-glew, using
 " bread to efface the old tracks. Or they may be a proper ground of whitening,
 " into which the durable lines are stained ; the other being to be wiped out with
 " a sponge. Or they may be box, or ivory, or unburnished silver ; if the lines
 " engraven be so filled, that the pencils stick not in them to hinder the motion."

Upon some debate, it was referred to the COUNCIL, to consider of the expences, and the most convenient way of reducing this engine into practice ; as also, of additions to be made thereunto, whereof some were mentioned by Mr. HOOKE.

* Original Register, vol. ii. p. 321.

Mr. HOOKE observed, that a common sealed weather-glass might be made applicable to this weather-clock; and he was desired to give a proof thereof to the society at their next meeting.

Mr. DARCY was permitted to be present at this meeting, at the motion and desire of the lord BERKLEY.

JOHN CREED, esq; was also permitted to be present at the request of Mr. POVEY, and was proposed candidate by the president.

SIR ELLIS LEIGHTON was elected fellow.

The experiment of weighing little glass bubbles in the compressing engine was made with success; and Mr. HOOKE was ordered to bring in writing an account thereof at the next meeting.

The experiment of trying the force of powder by weight in the new powder engine contrived by Mr. HOOKE was made twice, but without success both times; once by reason, that the barrel broke in pieces; the second time, because the cover of the barrel bent. It was referred to Mr. HOOKE to think of a way to prevent these inconveniences.

Dr. MERRET being put in mind of his freezing experiments, promised to give an account of them before Christmas.

Mr. HOWARD's account of saffron was read again, because of the additions made by him since the last meeting. He also produced a saffron-kiln, and a cake, to be left with the society. His paper was ordered to be registered.

Mr. HOWARD promised to bring in an account of tanning and preparing all kinds of leather, after a new way; and upon his desire of having some of the society join with him therein, Mr. HENSHAW and Mr. COLWALL promised to do so.

Dr. CROUNE was put in mind to bring in the history of hat-making, which he had long since undertaken to do; and Mr. HILL, the history of paper; and Mr. PROBY, an account of the statutes of England concerning manufactures, especially cloth-making and tanning, and the frauds committed therein.

Dr. ENT mentioned, that deer-skins laid at the bottom of a vessel, and the skins of oxen and other beasts put upon them, would, after the affusion of water, strive to get on the top of the others. Dr. WILKINS suggested hereupon, that he had observed deer's hair in a microscope, and found them to be tubulous throughout, like quills; whereas the hair of other animals was like canes, full of pores, but not hollow; so that deer's hair being filled with more air than that of other animals, endeavoured, when put under water, to emerge on the top.

* Original Register, vol. ii. p. 323. It is printed in the *Philos. Transf.* n° 158. p. 945. for March, 1678.

Mr.

Mr. HOOKE was desired to observe in his microscope some of the deer's hair, what cavities they have: and Mr. CLAYTON promised to furnish him with some deer's hair brought from the Indies.

Mr. CLAYTON produced some of the Bononian stone unprepared, which was recommended by the society to Mr. BOYLE to make such experiments with, as he should think fit.

Dr. ENT promised to communicate his observations of springs.

Mr. BOYLE mentioning, that the tides of the rising and falling of water were as well observed in mines as in springs, Mr. POVEY offered to make a farther inquiry into this, and to bring in an account of it, together with what he had undertaken to procure concerning the several mines and ores, and the working of ores in England.

Dr. HOARE was put in mind of bringing in Col. NOVE's account of the mines of Cornwall and Devonshire; which he promised to do very shortly, together with some observations concerning ice-mares, and wheels let down to the bottom of the water in winter, and coming up again frozen, when there is no ice at all at the top of the water.

Mr. POVEY and Dr. HOARE were desired to join in the procuring a good account of these mines, and in making their correspondents send up some of the earth of the mines, and of the ore, as it is digged up, without disguise.

Mr. BOYLE mentioned, that salt-waters frozen into ice in very cold countries become fresh and potable.

He suggested, that whenever there appear any odd phenomena in thermometers, it may be observed, whether no bubble of air be seen on the top.

The operator was ordered to take care, that the piece of Dr. ENT's *lignum fossil* be brought to Gresham-College.

Mr. HOSKINS was desired to inform himself as particularly as he could concerning this *lignum fossil*.

Mr. BOYLE moved, that good inquiry might be made, whether the underground trees had been any where found with branches.

Dr. HOARE and Mr. BALLE promised to procure a farther information concerning this particular.

Dr. WHISTLER was desired to join with Dr. GODDARD in making the experiment of exhausting air out of rectified spirit of wine.

Mr.

Mr. HOOKE was put in mind to consider farther of the bow for killing whales.

Mr. HILL promised to endeavour to procure from Mr. DIGGES a bow of a locust-tree; which bow, he said, would stand bent for five or six months together, and not lose its spring.

Mr. POVEY promised to present the society with a piece of locust-tree.

The experiments appointed for the next meeting were one in the compressing engine, and another of exhausting air out of spirit of wine; the former to be made by Mr. HOOKE, and the latter by Dr. GODDARD and Dr. WHISTLER.

December 14. At a meeting of the COUNCIL were present

| | |
|------------------------------|-------------------|
| The lord viscount Brouncker, | Dr. Merret. |
| president. | Mr. Boyle. |
| Mr. Howard. | Sir Robert Moray. |
| Sir Paul Neile. | Dr. Whistler. |
| Sir Anthony Morgan. | Mr. Palmer. |
| Sir Peter Wyche. | Mr. Hill. |
| Mr. Aerskine. | Mr. Colwall. |
| Mr. Balle. | Mr. Hoskyns. |
| Dr. Goddard. | Mr. Oldenburg. |

Mr. BALLE promised to the society under his hand, as a present, the sum of one hundred pounds, to be paid in before the 1st of April following; and he presented them with an iron-chest having three locks and keys.

Sir ANTHONY MORGAN was desired to peruse the statutes of the society, and to communicate his remarks upon them to the rest of the new members of the council, and upon joint consideration had thereof to make a report to the council.

Sir ANTHONY accordingly took the statute-book home with him.

It was ordered, that Dr. WREN be desired to make an estimate of the charges of a plain weather-clock, such as he himself had devised; and to consider of the easiest contrivance to put it in practice:

That the secretary deliver in a list of the names of all the benefactors to the society, together with an account of their donations, and the time when they presented them:

That the said benefactors be registered in loose vellum sheets: And

That Mr. PALMER consult Mr. ELLISE, whether the charter of the society speaks fully enough to empower the council to grant license to their printers for printing such books, as shall be committed to them by the society concerning their design and work.

December

December 16. At the meeting of the SOCIETY

Sir ELLIS LEIGHTON was admitted.

Mr. CREED was elected and admitted.

Mr. WATERHOUSE gave notice of a letter received by him from Mr. CHILDREY, signifying, that the thermometer sent to him was broken: as also, that he would shortly communicate his manuscripts of observations of the weather, and first of all those of three several persons made upon every day of the year 1648.

The operator was hereupon ordered to make a stronger thermometer, and to send it to Mr. CHILDREY with all possible care: and Mr. WATERHOUSE was desired to give notice to him, that the said manuscripts, mentioned in his letter, would be very acceptable to the society.

Dr. MERRET presented a discourse of his concerning the tin-mines and the working of tin in Cornwall; which was read, and ordered to be registered¹. The doctor promised to furnish the society with the materials of these mines.

Mr. WATERHOUSE offered his service in engaging a friend of his in the west of England to give a good account of the mines there.

Mr. BOYLE moved, that some persons, who had the opportunity, might be desired to make a trial with two weather-glasses put in a mine, one sealed, the other unsealed, to see what the heat of damps would work upon the one, and the pressure of air upon the other. Sir ROBERT MORAY, Mr. POVEY, and Dr. MERRET were desired to recommend this experiment both in Scotland and England.

Dr. MERRET mentioned, that he had kept a thermometer in a cellar for a while, of which he intended shortly to bring in an account.

Mr. HOOKE's paper concerning the experiment lately tried before the society of weighing two small glass-balls in the compressing engine, together with deductions, was read, and ordered to be registered².

He was desired to repeat at the next meeting, with more exactness, the experiment made this day of weighing the condensing engine, after it is crowded full of air, to see how it then differs in weight from itself when filled after the natural manner.

He proposed an experiment to be made with the compressing engine, of applying a gun to it, to see, with what force it will be able to shoot a bullet, arrow, &c.

The operator was ordered to prepare a gun for this purpose.

¹ Original Register, vol. ii. p. 329. It is printed in the *Philos. Transf.* n° 138. p. 949, for *Narc*, 16; 8.
² It does not appear in the Register.

The operator was also appointed to try again by himself the experiment of the new powder engine, and to give an account of the success thereof at the next meeting.

Dr. GODDARD gave some account of the experiment committed to him and Dr. WHISTLER, of exhausting the air out of rectified spirit of wine; and promised to prosecute it, and was desired to give an account of all in writing.

Mr. POVEY promised to produce before the society a table of *lignum fossilis*, looking like wood, but being indeed stone.

Capt. TAYLOR was desired to send some of the wood of the locust-tree out of Virginia, whither he was going.

It was suggested, that the best sort of locust-trees grows in Jamaica.

Mr. HOOKE was desired to examine by his microscope some Indian deer's hair produced by Mr. CLAYTON, and to make a report, whether they are tubulous or not.

He was likewise put in mind to press the workman to dispatch prince RUPERT's perspective engine against the next meeting.

Mr. BALLE presented the society with an iron-chest having three locks and keys, and promised one hundred pounds to be paid for their use before the 1st day of April following. He received the solemn thanks of the society; and it was ordered, that he should be recorded as a benefactor upon the payment of that sum.

December 21. The COUNCIL met, at which were present

| | |
|-----------------------------|----------------|
| The lord viscount BOUNCKER, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Mr. BOYLE. | Dr. MERRET. |
| Sir ROBERT MORAY. | Dr. WHISTLER. |
| Sir PAUL NEILE. | Mr. HILL. |
| Sir ANTHONY MORGAN. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. HOSKINS. |
| Mr. BALLE. | Mr. OLDENBURG. |
| Mr. PALMER. | |

It was resolved, that the council meet on the Wednesday se'nnight following, being the 30th of December, and so for the future on Wednesdays at twelve of the clock, in Gresham-College, till farther order.

It was ordered, that Dr. GODDARD and Mr. PALMER be added to the committee for reviewing the statutes; and that this committee fix upon particulars, wherein they desire alterations.

Mr. PALMER reported, that it was the opinion of Mr. ELLISE, that the society's charter speaks fully enough to authorize the council for granting licence to their printers

1663.] ROYAL SOCIETY OF LONDON. 347
printers to print such books, as shall be committed to them by the society concerning their business.

It was ordered, that Mr. MARTYN and Mr. ALLESTRY be summoned by the operator to attend the council on the Wednesday following, about one of the clock, to receive their commission sealed: And

That Mr. EVELYN have leave to print the five discourses concerning cider, formerly brought and read at several meetings of the society, written by Sir PAUL NEILE, Dr. SMITH, Mr. BEAL, Mr. NEWBURGH, and Capt. TAYLOR; as also Dr. GODDARD's discourse concerning the texture of trees.

It was resolved, that no book be printed by order of the council, which hath not been perused and considered by two of the council, who shall report, that such book contains nothing but what is suitable to the design and work of the society.

It was ordered, that Dr. GODDARD and Dr. MERRET peruse Mr. EVELYN's book called *Sylva*, together with *The appendix of fruit-trees*, and the *Calendarium botanice*, and make their report to the council, according to the next preceding order: And

It was resolved, that the form of the *Imprimatur* given by the council of the society to their printer, be as follows:

" By the COUNCIL of the *Royal Society of London for improving natural knowledge*, ordered, that ——— book be printed by JOHN MARTYN and JAMES ALLESTRY, printers to the said society. *Dat.—die—mense—anno—*"

Signed by the President.

It was ordered, that Dr. MERRET and Dr. WHISTLER inquire of some members of the College of Physicians concerning the form of the warrant for bodies to be demanded from the sheriffs of London for dissection, and make report thereof at the next meeting of the council.

December 23. At the meeting of the SOCIETY,

Dr. ENT's table of *lignum fossile* sent him out of Ita'y was produced; and he was desired to permit, that some shavings of it might be distilled, to see, what this kind of wood would yield: which being granted by him, the operator was ordered to employ a joiner to plain this table for some shavings.

Mr. HOOKE was desired to look upon a piece of this wood through his microscope.

Mr. HENSHAW was desired to produce his book, that treats of the *lignum fossile*, or to give an extract of what is there discoursed of; which he promised to do.

Y y 2

Mr.

Mr. Hooke's account of the experiment made at the last meeting of weighing the compressing engine with condensed air in it, was read, and ordered to be registered*, as follows :

" The receiver of the engine being closed, as is usual, and the air in it being condensed into about a quarter of the space it at first possessed (which was known by the gage included within the receiver) the whole engine was put into a pair of scales, and counterpoised with a weight of seventy-nine pounds and three quarters.

" Then the stop-cock of the receiver being turned, and the included condensed air suffered to go out, the engine grew lighter by an ounce, there being so much added to the engine-side to bring it again to an equilibrium."

The same experiment was ordered to be made again more exactly at the next meeting ; and the operator was directed to provide a pair of fit scales for the weighing of the said engine.

Mr. Hooke produced the new perspective engine of prince RUPERT's invention, together with his own additions, to cast embossed things into perspective, as well as plat-forms.

It was ordered, that this engine be shewed to prince RUPERT ; but that first two rulers of wood be put in the place of the two threads, that direct the parallelism.

Dr. GODDARD gave some farther account of the exhausting of the air from spirit of wine ; and what strength the spirit lost, and how much it grew lighter by it ; of all which he was again desired to bring in an account in writing.

Mr. BOYLE moved, that a trial might be made to exhaust the air from bodies not fluid ; alledging, that he had made the experiment upon oil of anniseeds, which being congealed and put into the engine, upon the evacuation of the receiver, sent bubbles out of its body very conspicuously. He added, that he intended to prosecute this kind of experiment upon several other bodies, and promised an account thereof.

Mr. Hooke produced a microscopical observation of the hair of an Indian deer, which represents it to be like a sponge, not like quills.

Dr. ENT being called upon for his observations of springs, promised to bring them in after his lecture†.

Sir ROBERT MORAY mentioned, that he had received from Africa some boxes with poison, and had left them with the president, who was desired to produce them at the next meeting.

* Original Register, vol. ii. p. 328.

† probably at the College of Physicians.

Mr.

Mr. BOYLE related, that the viper-catchers find in the bag, wherein they keep their vipers, young ones among the old, and the old ones whole and found.

Dr. CROWE affirmed, that he had seen several young eels alive in the belly of an old one, some of which were as big as a pin, others as slender as a fine thread, others yet unformed like a *mucus*.

Mr. BOYLE added, that he had met with the like relation in a German author.

Mr. HENSHAW remarked, that he had seen fish spawn having both eggs and little live animals moving up and down in the shell. Mr. HOOKE was desirous to make observations of fish-spawns with a microscope.

Mr. BOYLE being put in mind of having been formerly desirous to consider and give an account of GLAUBER's way of discovering minerals, informed the society, that this was only by mixing some glass with the mineral, and that thereby the metal predominant in the ore is discovered.

Dr. GODDARD being called upon for the experiment formerly committed to him of comparing the weights of metals in air and water, and he not having yet made it, it was desired, that he and Dr. WREN and Mr. HOOKE should be joint-curators to provide Monsieur MONCONY's way of weighing bodies in water. And Dr. GODDARD mentioning another way of doing this, it was ordered, that both ways should be prepared.

Occasion being given to discourse of tormenting a person with the sympathy-powder, Dr. WREN related, that in the house of a kinsman of his, the experiment had been tried by him upon a servant, who had grievously cut her finger; and a rag rubbed upon the wound being dressed with calcined vitriol, and put into the maid's bosom, her finger within a short time was cured. Whereupon he had taken the rag from her, and heated it upon the fire, whilst the maid was sweeping the next chamber; who, upon a sudden, flung away the broom, and cried out for the pain in her finger; which being looked to, was found very fiery: upon which they cooled the rag again, and dressed it as formerly, and within a day or two the finger was intirely cured.

Mr. BOYLE undertook to try this experiment upon a dog.

He being reminded of his promise to procure the way used by the earl of CORK^b in transporting carps into Ireland, said, that he had now a good opportunity to perform his promise, the earl being then in London.

It was ordered, that every member of the society, to whom experiments and observations had been formerly committed, and who as yet had given no account of them, should have a note of their arrears in writing, to put them in mind thereof: And

^b RICHARD, eldest brother of Mr. BOYLE.

That

That the propagating of cider-fruit be prosecuted; and that the members, who had opportunity, should recommend that business to their friends: as also, that Mr REED should be written to by Mr. HOSKYNs and Mr. OGDENBURG to furnish grafts. And Mr. HOWARD was particularly desired to advance this work.

December 30. The lord ASHLEY was admitted.

The shavings of Dr. ENT's *lignum fossilis* were committed to Mr. BOYLE for distillation.

Dr. MERRET's account of the experiments of freezing made by himself in December and January, 1662, was read, and ordered to be registered; but he desired to keep it in his hands for some little time. It was as follows:

" Since the business of freezing is obnoxious to many various contingencies, I must necessarily premise these following circumstances; that these experiments were made in very hard weather, yet with some alternate relaxations, the frost continuing above six weeks; and the place I chose was stone windows, exposed to the north and north-east winds, and some upon the ground. The vessels were glass canes of several bores, earthen and pewter small pans and porringers, spoons of pewter and silver, glasses of various figures; as vials cylindrical, round, and square; flasks, recipients, bolt-heads, and some conical ones. Most whereof, by the diversity of their figure, their openness or closeness, produce various effects in freezing, as the following observations will shew. The quantity also of the liquor to be exposed is to be considered; for what will shew a small thin plate of ice in a small parcel of some liquors, will shew none in a greater.

" The method I shall follow in delivering my observations, shall be, 1st, To run over the various figures or bodies, whether fluid or consistent, simple or compound, &c. used in this work. 2dly, What figures observable in those ices. 3dly, Some effects arising thence. 4thly, Some properties and qualities. 5thly, Some lets or helps both to freezing and thawing. 6thly, Some uses of ice.

" In pursuance of which particulars, I had recourse to those ingenious queries of Mr. HENSHAW, registered in your *Cinelia*, and then to BARTHOLINUS's late book *De Nive*, and to my own collected notes from various authors, adding whatever trials I thought meet. And in all these I have barely set down matter of fact, neither mentioning the authors and their errors, which would have been both nauseous and tedious; nor shall I endeavour to render a reason of the various *Phænomena* (which cannot be done without a volume) but shall leave that province to an honourable person of this society, who hath had much experience and reflexions on this subject. And now to my task.

" As to my first head of things used, I shall begin with common water, which I exposed in a triple state in like quantities and in open pans, *viz.* 1st, cold;

Original Register, vol. ii p. 336.

" 2dly,

“ 2dly, boiling hot; 3dly, an equal mixture of both the former. The effect was
 “ this, the cold was frozen in one hour; the boiling hot in two hours; and the
 “ mixt in an hour and an half: but with this difference, that the cold did freeze
 “ first at the top and sides, and had a large thick crust, before there was any shew
 “ of ice in the boiling hot; but the mixt and boiling hot began to freeze first at
 “ the bottom of the vessels, and when the top was cold, then it freezed there
 “ also, leaving between the bottom and top of the vessel a cavity for the water,
 “ which in time was wholly converted into ice. The same succeeded most mani-
 “ festly in these waters poured on a smooth table, where the cold water was pre-
 “ sently frozen, before the boiling hot water could become cold at the bottom.

“ Water exhausted of air, in Mr. BOYLE’s engine, was frozen almost as soon
 “ as a like quantity exposed in an open pan: the ice whereof appeared white, and
 “ to consist purely of bubbles. The glass used was a four-ounce round vial, and
 “ a small tube one foot long, half filled with water.

“ Fair water, wherein arsenic had been infused eight months, congealed much
 “ sooner, than a like quantity of water, into very white ice.

“ Solutions of all the sorts of vitriol freezed sooner in pans and tubs, than water
 “ or any other solution of the other salts, by much; though that of allum came
 “ very little short of it. The ice kept both colour and taste, upon the least touch
 “ of the tongue, in all of them. A solution of allum did freeze into an ice whiter
 “ than milk, and stuck so close to the sides of the pan, that it could hardly be
 “ separated from it. This was the firmest ice offered to me in all my trials, next to
 “ which, in both these qualities, were the vitriols, especially the Roman.

“ Sandever quickly freezeth; frit sooner than it, and kelp than them both; all
 “ of them into lumps very white, and consequently not diaphanous.

“ Sal armoniac shewed some variety in point of time; for in the same pan,
 “ quantity, and place with the other salted waters, it would for the most part freeze
 “ long after the former, though once it did before them.

“ Common salt, two drachms dissolved in four ounces of common water (for
 “ that proportion I observed in all my solutions) did in thirty hours space, in the
 “ hardest season, turn to pretty hard and white ice, whereas the former solutions
 “ became so in two or three hours at the most.

“ A beer-glass was filled with stinking sea-water, full of salt, which within
 “ twenty-six hours acquired at the top a plate of ice of the thickness of an half
 “ crown piece, with few bubbles in it. This tasted salt and stinking as before,
 “ but being dissolved at the fire (or thawed of itself) the stinking taste was gone,
 “ but the saltish continued. The residue in the glass, within four days (the season
 “ continuing, and plates taken off once in twenty-four hours) was frozen through-
 “ out; but that at the bottom of the glass seemed to have a much brisker taste
 “ than that at the top, neither was it so firm and friable as that. I tried another
 “ beer-

“ beer glafs with the fame water, which froze moft part of it; but the feafon continued not fo constantly fharp fo long together as in the former experiment, and therefore I could conclude nothing therefrom. But in fmall broad earthen pans fet in ice, in thirty-fix hours the fame water became ice throughout; and with the addition of a parcel of ice or fnow, much fooner.

“ Some water was impregnated with as much bay-falt, fome with as much falt-petre, fome with as much fal armoniac as the water was capable to receive; and neither of thefe did congeal with a very high degree of cold continued fix days together.

“ A folution of falt of tartar converted into ice, in much longer time than common water: I obferved that it began to freeze in a tube at the top, bottom, and fides firft, leaving the liquor in the midft unfrozen; whereas other folutions and liquors congealed uniformly, by defending or afcending, or both at the fame time, from fide to fide through the middle. Of this I made but one trial.

“ Salt petre required twenty-eight hours in a very cold feafon, and in that time became in the open pan a moft pure white ice, perfectly like fal prunellæ, which an apothecary miftook it for. This ice, thrown into the fire (after the aqueous humidity was evaporated) did fparkle as that falt ufeth to do. A ftrong lixivium made hereof, with an addition of copperas or allum, fingly or mixt, fet in fnow and falt, or falt alone, was frozen in one night.

“ Sal gem alone, of all the falts, though fnow and ice were mixed with it in great proportion, and though the pan was fet in falt and fnow, could not all that time be brought to congelation: an odd experiment.

“ Phlegm of vitriol begins congelation (or coagulation rather) near as foon as fair water. A pretty large tube was filled three quarters full with this oil, and about a quarter thereof was frozen, the reft remaining at the bottom uncongealed. This tube was broken in the prefence and by the command of this honourable fociety, the coagulated part whereof was taftef by many then prefent, and concluded by all thofe, that it was a ftrong vitriolate tafte. This coagulated part was of a paler colour than the other; and both thefe mixed and poured into a vial-glafs heated it fo hot, that none there could hold it. This coagulated part kept fo in the air a week after all my other liquors had been thawed, and would in probability have continued fo much longer, had not the glafs been broken. I expofed another leffer tube with the fame oil, which became frozen throughout, and required very much relaxation in the air to return to its former humidity.

“ I had fet a mark on thefe tubes (as on all the reft, to obferve their feveral rifings) and the oil of vitriol, when coagulated, fank more than half an inch below it; and being diffolved at the fire, returned to its firft ftation, as you alfo faw. And this *φαισθησις* is peculiar to this oil alone, all other liquors rifing higher than the mark.

“ I now

" I now come to my stronger liquors of beer, ale, and wine.

" I exposed at the same time a flask of small-beer and another of strong ale, the former whereof was frozen throughout in thirty-eight hours; but three pints of the ale continued unfrozen after six days continuance of very hard weather. And as the air then disposed to thawing, I broke the flask, and with the unfrozen liquor made an excellent morning's draught at four in the morning. This ale in colour, strength, and quickness, seemed to me and the other three tasters, that sat up with me, much better than when it was first put into the flask; and by comparing it with some other in the house of the same barrel, we plainly found the said difference. After this I took the icy part of the ale, and thawed it at a fire, which was in all a pint of liquor (though the flagon containing three pints of liquor was filled with that ice) very pale, and of a quick and alish taste, very much resembling that drink, which the brewers call *Blew John*. This ice was not so firm as that of water, but fuller of bubbles. I assayed the same a second time, but could not, by reason of the changeableness of the weather, attain so great a thickness of ice as in the former; and in this also I found the same changes as before.

" A beer-glass of Hull ale, in twenty-four hours, contracted a crust of ice as thick as an half crown, and proceeding as in sea-salt-water, the *Phasimata* were the very same; all the laminæ taken off appeared of the same colour and taste, and the lowest ice was the most tender. Another glass of the same ale exposed, did not freeze throughout (no crust being taken off) in five days, when my own ale did in a like glass, both being set out together. Now the taste and colour appeared the same, or at least had no sensible difference, when they had been thawed of themselves and when first exposed. Hull ale hath a brackish taste.

" Claret very strong, exposed in a spoon, in thirty-five hours hard freezing, became an ice, all of it; it was soft, kept its former colour and taste, soon dis-covering to the tongue of one, who knew not whence it was, its nature, quality, and kind.

" Canary at the same time in a spoon exposed, in thirty-eight hours, acquires on its surface an exceeding thin plate of ice as thin as the finest paper, and proceeded no farther in four days time then following.

" Neither claret nor canary would shew the least sign of congelation in tubes, much less in bottles.

" Two ounces of the best spirit of wine, exposed in an earthen pan, did all evaporate in less than twelve hours; but the same quantity of brandy left near a spoonful of insipid ice, without any taste of the spirit, which cast into the fire flamed not at all. I could discern no bubbles in this phlegmatic ice, but having interpolated it betwixt mine eye and a candle, it manifested many bubbles by its shadows. Quære, whether this may not turn to profit in colder countries, in rectifying spirit of wine?

VOL. I.

Z z

" Now

“ Now we come to confitent bodies, and shall begin with animals and their parts.

“ Two eyes, the one of an ox, the other of a sheep, in one night were both totally frozen, the three humours very hard, not separable one from another, neither of them diaphanous, as naturally they are, and the crystalline was as white as that of a whiting's boiled; the tunicles, fat, and muscles were also frozen, as appeared by their stiffness, and putting them into cold water; the ice of the waterish and glassy humour seemed to be made of flakes.

“ A pint of sheep's blood did freeze at the top, and all the sides of the dish wherein it was put, and was nothing else but the scum of the blood. This ice being separated from the blood, and thawed at the fire, and then again exposed, congealed into a feeming membranous substance, and was taken for such by some that saw it, and so continued in a warm season, and so appeared in all respects a membrane. This also was seen and registered in the journals.

“ The blood remaining gave me no signs, that frost had taken it.

“ I dissected a dog and cat, having lain dead in the open air, and found their entrails, nay the very heart, stiff, and some little ice in the ventricles of their hearts and their *vena cava*.

“ Milk soon freezeeth into most white flakes of ice, retaining the proper taste of milk: those flakes are soft, and manifest not many bubbles.

“ Several eggs were exposed, and both yolk and white in one night were hard frozen. They require a longer time to freeze than apples do. The best way to thaw them both, is to lay them on Newcastle coal, or in a deep cellar. Whether eggs once frozen will produce chickens or no, I cannot say, but have been told by good housewives they will. Some affirm, that eggs and apples put into water, the ice will be thawed within them, and the ice appear on the shell or skin: 'tis true, if you hold either of them near the surface of the water, they will soon gather a very thick crust upon their outsides; but if you then break the one, and cut the other, you shall see them full of ice, and the egg then poached, will taste very tough; so that this ice seems to be gathered from without, and not to come from within. And besides, if it did so, they must needs lose their weight, the contrary whereof will anon appear. But for the more surety, I proceeded to this farther experiment: I immersed in my cistern an egg and an apple two foot deep into the water, and there suspended them with strings tied about them, to keep them from sinking, for the space of twenty-four hours, and then took them out and opened them. I could never observe in that time, though I often looked at them, any ice on their outsides, and the one being broken, and the other cut, were found both of them within full of ice.

“ The next order shall be vegetables, and of them a few instances, especially of those which are of a biting or fower taste. Now for the first, I employed the roots of horse-radish and onions (for other edible roots and plants, every one

" knows, will freeze) which shewed the frost had taken them by their taste, and ice was found between each of the skins of the onions, retaining the taste of the root. Yet I have observed beer, wherein horse-radish and garden scurvigrafs have been infused, will not freeze so soon as other stronger beer without them.

" Oranges and lemons frozen have a tough and hard rind, their icy juices lose much of their genuine taste; they were both frozen hard in twenty-six hours, or a little more, having a thick rind. They, as other fruits, when thawed, soon become rotten, and therefore the fruiterers keep them under ground in low cellars, and cover them with straw, as they do their apples.

" Which did, exposed, in one night, freeze throughout: if you cut one of them through the middle, it will have, on both the plains, a most pure thin ice, hardly discernible by the eye, but easily by the touch, or by scraping it off with a knife. The cores of these apples soon turn brown, and begin their corruption there.

" Oil exposed did acquire the consistency of butter melted and cooled again; but in caves and cellars I could never see it more than candy. Strong white-wine vinegar did all soon freeze in a tube, and without any apparent bubbles.

" And to conclude, without mentioning nuts, bread, butter, cheese, soap, and many other things, which came under my trial, it is most certain, that whatever hath any waterish humidity in it, is capable of congelation; what are not, you have in the next paragraph.

" Having now done with what will freeze, I shall briefly recount some things, whereon the cold hath no such effect.

" We mentioned before spirit of wine; add to it such strong waters, as are made of it, viz. *aqua Mariæ, cælestis*, &c. and Canary wines in large vessels. 2dly, The strong lees of soap-boilers, and others made of other salts, to which refer the spirits extracted from salt, vitriol, salt petre, aquafortis, and spirit of sulphur; which last precipitated to the bottom of the tube a small quantity of powder very like in colour to sulphur vivum, which being separated from the spirit (for nothing of that incorporated) cracked between my teeth, and tasted like brimstone; and being put into water, made it as white as lac sulphuris doth, but it would not flame, perhaps because too much of its strong acid spirit was mixed with it. Spirit of foot afforded also a precipitation or sediment (the spirit not congeling) at the bottom of the tube, of a yellowish colour, but much bitterer than the spirit itself, and inflammable also.

" But here it is to be observed, that the said spirits, that would not freeze alone, yet with a mixture of about twelve parts of water, or less of ice or snow, did freeze throughout; except the spirits of salt, of nitre and aquafortis, which would not freeze with those quantities of water, ice and snow. I intended to have tried them with a greater quantity of the said ingredients, but the weather failed me.

Z z 2

" Whether

“ Whether the salt-waters freeze in the sea, I cannot experimentally determine, but shall add what was told me by one, that said he had dissolved ice in the northern seas, and found it very salt.

“ The next proposed was the figure of liquors frozen, wherein I shall observe in general, that most of the liquors differed one from another in their figures, and being permitted to freeze and thaw often, they still returned to the same figures, most whereof were branched. Allum appeared in lumps; saltpetre, tartar, milk, ale, wine, and sal armoniac in plates, and other liquors mentioned to freeze into a very soft ice, seeming to be made up of small globuli adhering to each other. Fair water, kelp, and the frits resembled an oaken leaf, the leafy parts being taken away, and the fibres only remaining, the interstitia being filled up with smother ice. The middle rib (if I may so say) as in plants was much bigger than the lateral ones: all which seemed but different *stiriae*, whose points extended toward the outside of the vessel containing the water, and made acute angles with the middle rib, toward the lesser end of the said leaf.

“ Concerning the figures of frozen urine, I shall say nothing; the accurate description of curious Mr. Hooke having so fully and truly performed that part of my task.

“ Now as to the former experiment of QUERCETAN, and affirmed by many other chemists, I made experiments in these following vegetables, rosemary, rue, scurvygrass, mint, and plantain, wherewith I thus proceeded: I mixed with half a pint of their distilled waters, half or three quarters of an ounce of their own salts: the rosemary and rue were calcined, and their salts extracted with their own waters, and then were added to their salts their own distilled waters in the above-mentioned proportions. The glasses, wherein the rue and plantain were put, being sealed with HERMES seal, and the other glasses left open, the effect was, that neither of them shewed the least resemblance of the plants, from which they were extracted; neither figure nor shew of roots, stalks, branches, nor leaves (but only a lump of small globuli) much less of flower or seed. Besides, the kelp frozen hath many fibres, which is made the most of it of *alga marina*, whose leaf is long and smooth without fibres in it. This one thing I cannot pretermitt, that the scented waters seemed upon their thawing to have acquired and advanced much in their scents, and especially the rosemary, whose salt hath no smell, and its water but little; yet thawed, they smelt as strong almost as fresh leaves rubbed and smell'd to.

“ A large recipient was filled with water, which being frozen throughout, and the upper crust of the ice broken, there appeared in the middle of it a multitude of thin laminæ of ice, some more some less wide, from which proceeded *stiriae* or teeth pointing inwards, and set at pretty equal distances; so that the laminæ and *stiriae* resembled very much so many combs placed in no order, some lying directly, some obliquely, none transversly; having intervals betwixt each of them: betwixt some of them I could put my finger without breaking the points
“ of

“ of the stirie. Those combs were placed round about a cavity in the middle
 “ of the receiver, sufficient to receive two of my fingers.

“ In a flask filled competently with water, being frozen, there appeared through-
 “ out the ice infinite silver-coloured bubbles, very like unto tailed hail-shot, of
 “ several sizes, the largest about a quarter of an inch long, where thickest, of
 “ the bigness of a great pin’s head, others much less in all dimensions. The points
 “ of them all looked outwards, and the bigger part inwards towards the centre,
 “ where also were the largest: for they would easily admit a little pin into their
 “ cavities without the least resistance. The figures of them were pretty regular,
 “ first a small thread, and then a head as big as a shot, and thence gradually en-
 “ ded in a point: some of these were strait, most a little crooked. There was a
 “ cavity in the centre of this ice filled with unfrozen water, from which I could
 “ find multitudes of cavities of bubbles not fully formed; and in the more solid
 “ parts of the ice cut, you may discern them by a black spot where the hole en-
 “ ters into the cavity. All the same phenomena appeared in a second trial, but
 “ the bubbles were shorter and larger, and not so deep pointed. The like I also
 “ observed in a conical glass sealed up.

“ The next thing to be treated of is the effects of freezing, viz. the expansion
 “ of liquors frozen; and consequently thereunto, the breaking of bodies, wherein
 “ they are inclosed. All the liquors tried did sensibly, in glass tubes, rise beyond
 “ any mark, before the liquors could sensibly be discerned to freeze; and after,
 “ rose somewhat higher with freezing. The height of the rising I shall here set
 “ of a few experiments, instead of many made (having troubled your patience
 “ too long in the former paragraphs) in several processes. Vinegar and urine rose
 “ above half an inch, and lees made with salts of rosemary, kelp, the frits about
 “ a quarter of an inch; solutions of allum and copperas somewhat less; and in
 “ general, the saline liquors less than water, which rose a full inch; and small
 “ beer, in a very narrow tube, four inches: but water, in the small capillary tubes,
 “ could not be perceived either to expand itself, and certainly not to freeze at all.
 “ Oil of vitriol alone (as hath been said) sinks below the mark; hot water put
 “ into a tube first sinketh, till it is cold, and then riseth before it freezes.

“ Open-mouthed glasses, such as beer-glasses, &c. filled with water up to the
 “ brim, when frozen, the ice will manifestly rise above the superficies, and make
 “ a solid triangle there: but narrow-necked glasses more plainly shew this rising.
 “ In a flask, filled with water four inches below the mouth, the ice rose above
 “ the mouth, and hung two inches without it; and once, in a bolt-head, the ice
 “ rose five inches above the water-mark. And here I shall briefly add two things;
 “ first, that if glasses be filled about two thirds full, they seldom break; but if
 “ more, they will, for the most part, break. Secondly, that round-figured or
 “ spherical glasses, for the most part, break in an uniform manner. I filled a
 “ bolt head full to the neck, and stopped it at the top, which was twelve inches
 “ distant from the body, with a piece of melted candle; the ice rose above three
 “ inches in the neck, and the glass broke in the thinnest part of the body: from
 “ the point of breaking, as from a pole, the cracks ran as so many meridians, but
 “ unequally.

“ unequally distant each from the other, and consequently concurred not in an opposite pole on the other side; besides that there was great difference in the length of these cracks, none whereof went round the glass. In a flask thus cracked, in many places, the cracks were very irregular in all places; for some of them ran from the centers upward, others downward; some somewhat parallel, but most obliquely, and few of them were considerably strait. Glass bottles, and especially stone jugs, keep very little, and the last no method in their breaking; the same also befalls square glasses. Woods follow their grain, and metals no order at all.

“ And now I come to some remarks; proceeding (as I said) from this expansion, viz. the breaking of the vessels, or force of freezing; wherein also you may take notice of that quality of cold mentioned by the poet, *penetrabile frigus*, piercing where light comes not.

“ Two oval boxes, the one of box, the other of maple (both firm woods) containing each about two ounces of water, were filled full, and with screws closed very fast; but these boxes were rended from the bottom to the top in one night, with gaps big enough to receive a barley-corn into them. These woods retch but little, and therefore break more surely, and with larger rents, than softer woods will do.

2. “ A pepper-box of latten, made of iron covered with tin, had the neck broken off, and holes made in the top near the neck; and the bottom, where it was soldered, was so dislodged, that water would easily run out there.

3. “ Lead pipes laid above-ground were broke in many places; one I saw twenty yards long, broken in seven places; and another in my cellar six yards long, broken in two places. I saw likewise in many places of this city leaden pipes, above a foot deep under-ground, broken in several parts.

4. “ Cocks of cisterns, and other brass cocks, and also the barrels in pumps, made of brass or lead, usually break with the frost.

“ I exposed a copper box of a pear-fashion, which did bear three several freezings, by reason of the great extensibility of that metal; but at the fourth assay, it cracked all along one side of it almost to the screw. Next, I tried a cylindrical silver inkhorn, but that did bear five trials, and therein I could perceive neither crack nor dilatation of its superficies: I intended to have tried it in a small bottle, but the weather failed me. I exposed also a round silver ball, of the bigness of a large nut; the silver became very sensibly extended to a large superficies, but did not suffer any solution of its continuity.

“ Tobacco-pipes, and all earthen ware, taking any frost in their drying (before they are burnt) become very brittle; and being put into a strong fire, will certainly break into many pieces. Tiles of houses, and hard stones in buildings, scale and break off upon thawing; and thence it is, that the northern sides of
“ stone

“ stone buildings first decay and moulder away, as it is most manifest in antient
“ magnificent structures.

“ Alabaſter or marble having any chinks in them frequently break with froſt ;
“ and the ſtatues tell me, they never ſaw any ſolid marble break. As for flints,
“ paving ſtones, precious-ſtones, and ſuch as will receive a poliſh ; the bitumens,
“ as amber, kennel-coal, &c. I could never ſee any effect on them.

“ The next effect ſhall be of adheſion, concerning which take the following ex-
“ periments.

“ A ſmooth piece of ice was laid on a ſmooth table, and common ſalt thrown
“ upon it : the effect was, that the ice ſtuck ſo firmly to it, that it could not be
“ ſevered from the table without breaking the ice into many ſmall pieces : and it
“ will continue in this cloſe coheſion, till the ſalt hath corroded through the ice
“ to the very table (making many holes in the ice) and hath melted it to the very
“ bottom. But if you lay ſalt firſt upon the table, and ice upon it, then the ice
“ ſticketh not, but thaweth.

“ Theſe following ſalts applied (as before common ſalt was) cauſe adheſion to
“ the table, but not ſo firm as it, *viz.* kelp, ſandever, ſal indus, gem, prunellæ,
“ armoniac, and potaſhes, but not allum or vitriol.

“ The next experiment of adheſion was this ; I held a nail between my lips in
“ the open air a very little ſpace, which ſtuck ſo firmly to them, that I could not
“ pull it thence without difficulty or pain.

“ Another effect is concentration of ſpirits and colours : concerning the former,
“ you have already as much as I know, eſpecially in the paragraph of freezing
“ beer and ale : concerning the latter, take theſe following trials ; cochineal was
“ boiled in water to a very high tincture, and frozen ; and to twice four ounces of
“ this decoction was added, in one glaſs, a little ſpirit of wine, about a little
“ ſpoonful ; and in another, as much ſalt-water : all theſe were frozen through-
“ out, and every part of this ice ſeemed to me of an equal colour, though the
“ edges, as thinner and nearer the light, appeared of a brighter colour (as they
“ do unfrozen) but the glaſſes being broken, ſhewed no diſcernible difference in
“ any of them, neither as to colour nor taſte. The like trials were made with
“ madder-weed and indico, and the ſucceſs the ſame.

2. “ I expoſed a pint porringer full of the decoction of foot, which (the air re-
“ laxing) did only freeze an inch thick ; this continued above a week conſiſtent (in
“ a thawing-ſeaſon) and very ſolid. Some that ſaw it judged it to be brown ſugar-
“ candy ; the taſte whereof was near, if not altogether, as ſtrong as the uncongealed
“ liquor remaining at the bottom. And in another trial, when the whole was frozen,
“ no concentration was ſeen. But though it was not my hap to find this effect, my
“ trials having been made in vials, ſquare, cylindrical, or round, yet Mr. HAAK,
“ a

“ a worthy fellow of this society, happily lighted on it, as you may perceive by
 “ his relation and schemes of his glasses hereafter inferred.

“ Some affirm, as an effect of freezing, an addition of weight made in the bodies frozen; but this affirmation answers not my trials; for in four eggs and four apples, fully frozen, I found the weight of them the same when frozen and thawed, as they had before they were exposed, each of the eggs and apples being weighed in this triple state, both severally and jointly: with the particular weights I shall not trouble you. Besides, that freezing adds no weight, it is apparent in sealed glasses, from whence nothing can expire, and by exact ponderation of them, I could not perceive any the least difference in weight in the said triple state. This I tried several times with as much exactness as possibly I could, and still found the same event.

“ I shall now conclude the effects of freezing, by ranging them into good and bad: the good are the long preserving bodies most subject to putrefaction, healthiness, and confirming the tone of all animals, and thickening the hairs and furs of such as have them, fattens some; besides, it exceedingly clears the air, and other bodies, as it is manifest by the stinking sea-salt-water before-mentioned, as also by this that followeth; namely, I took six of the most musty stone bottles I could procure, and competently filled them with water, which, after freezing and thawing again, became as sweet as ever they were before.

“ Bad effects are, the killing and destroying animals and vegetables, by congeling and stopping their vital and nourishing juices, rendering them totally immovable. It is observable in Greenland and *Nova Zembla*, nothing but grass grows; as also what was told me by Dr. COLLINS, the present physician of the emperor of Russia, that no thorny plant nor thistles grow in that country. And this present year, most of the rosemary and sage about London was wholly destroyed, besides most of the more tender plants.

“ My fourth proposal was the properties and qualities of ice, some whereof my task engageth me to enumerate only; such are, its slipperiness, smoothness, hardness; whereby, and by its bulk and motion, it breaks down bridges, &c. its firmness and strength, to bear carriages and burthens; its diaphaneity, which is much less than the liquor of which it is made; for I could never discern any object, though but confusedly, a foot beyond the clearest piece of ice, by reason of the many bubbles and luminous parts within it; which bubbles shew only shadows; but the ice itself, interposed betwixt the eye and the candle, appears in many round circles, from which proceed many rays of light, four, five, or more, in the form of a star, of about a quarter of an inch in diameter, which so glaze your eyes, you can scarcely see any thing but bright light and shadows.

“ As for its penetration and thickness something hath been said above, to which I shall add, that I have seen the Thames ice of the thickness of eight inches “ and

“ and more, near the middle of the river, and on the side above a foot ; and in
 “ garden walks, the earth frozen near three foot deep ; whereas on the sides of the
 “ same walks, on a richer mould, the frost did not reach much above two foot
 “ and a quarter ; and pipes of lead have been broken above two foot under the
 “ surface of the ground. I shall not mention the huge mountains of ice found in
 “ the most northern seas, but proceed to its weight.

“ It is generally known, that ice swims upon the water ; but I have seen snow-
 “ balls moistened only with water, and then compressed with a strong force, and
 “ afterwards frozen, to sink : besides, the congealed oil of vitriol descends in
 “ water, and common ice is frequently observed under water. Whether the solu-
 “ tions of salt frozen will sink, was by me forgotten to be observed ; and whether
 “ congealed oil will sink in frozen, as BARTHOLOMEW affirms. Some affirm, that
 “ snow-balls hard pressed, without addition of water, will sink ; but experience
 “ teaches me the contrary.

“ As for its tactile qualities, every one knows it is colder than water, which
 “ you may increase by adding salt unto it, or rather snow.

“ Smell it hath none, but it binds up that quality in all, but most spirituous
 “ bodies, which it also in some degree refracts in them.

Lastly, ice yields both reflexion and refraction, whereof I shall speak, when I
 “ come to its uses,

“ My fifth head was lets and helps in freezing, which I shall briefly dispatch.
 “ Those, besides the north and north-east winds, the absence of the sun, and
 “ the highest parts of houses or mountains, are the mixture of snow and salt (than
 “ which there is nothing more painfully and unsufferably cold to my feeling) as
 “ is apparent by the trick of freezing with snow and salt by the fire-side ; as also,
 “ by the ingenious way of making cups of ice, invented by an incomparable per-
 “ son. One affirms, that salt petre dissolved in water, and put into a bolt-head,
 “ and long agitated, not only cools the hand exceedingly (which is very true)
 “ but also converts it to ice ; yea, in the very summer months ; which answereth
 “ not my tryal, though kept a whole hour in that agitation in the hardest person.
 “ This following experiment I also add, proposed to me : I filled a bolt-head,
 “ containing a quart of water, and set it in an iron pan, surrounding it on every
 “ side with snow, which covered also part of the neck ; and then set the kettle
 “ over the fire, whilst the snow was thawing ; but not the least sign of freezing ap-
 “ peared in the water put into the bolt-head.

“ As for the help of thawing, I shall add but this one experiment ; I set
 “ the same cellar three pans full of ice ; one in Newcastle-coal, a second on sand,
 “ a third on the earthen floor ; they thawed in the same order they are mentioned ;
 “ which was thrice repeated, and once, that placed on the coal did thaw, when
 “ the other continued their ice.

" Scaled glasses seem neither to promote or hinder this act of freezing. The same success I had with apples and eggs in my cellar.

" The last thing I shall speak to is the use of ice. You may therewith make a syphon, being fastened and applied as usually syphons are; and this will happen, whether you make it one continued piece of ice, or two contiguous ones; for in both the water will run exceeding fast, and this syphon soon emptieth all the water out.

" A second use is for refraction, whereof Mr. Hooke hath given you already a learned demonstration. And I having formed some smooth ice into various figures, like most of them mentioned by the dioptric writers, the phenomena were the very same as in them, like figured glasses: but how DES-CARTES made dioptric glasses of it I know not, especially to make use of them. And lastly, you may make a speculum of it, especially if a piece of blacked paper be placed behind it: and if you hold a candle at a convenient distance, there will appear very many speculums to your eye, according to the number of the bubbles contained in the ice: but I could not observe any heat proceed from ice cut in the true figure for burning-glasses, and exposed in naked ice; but frozen in spherical glasses, it will heat a little."

Mr. HAAK's account of his experiments of frost's separating the parts of coloured water, was read, and ordered to be registered^d, as follows:



" A small glass bottle of the figure in the margin, holding between the fourth and fifth part of a pint, being filled with conduit-water, coloured with six or seven grains (or worms) of cochineal, the water did freeze so hard one night in December, that it burst the bottle into shivers, only the parcels hung on yet by the ice till it thawed; but that, which seemed most observable was, that the lower more conic part of the icy body, about a quarter of an inch thick, was altogether colourless, or crystalline-like; and by the next morning, the coloured parts had contracted themselves from the whole circumference in such sort towards the center, that their hue appeared much deeper, and the shape and proportion much like the yolk of an egg; all the parts about remaining very bright and crystalline, until by the succeeding thaw, the coloured parts were observed soonest to yield, and to soak from within their last compacts, whereby the same was left very porous, hollow, and spongy, or husk-like; of somewhat a greyish, or a bright ash-colour hue, not dissolving till a good while after, with the rest of that ice.

^d Original Register, vol. ii. p. 333.

" The



“ The thawed parts being all saved and mixed again,
 “ were put into another Venice-glass-bottle, of the fi-
 “ gure in the margin, and stood the great frost in Febru-
 “ ary, which likewise burst the bottle, and had made the
 “ coloured parts to concenter, though not so much elevated
 “ from the bottom as in the former glass; neither were the
 “ whiter parts altogether so clear: there was a small parcel
 “ of coloured ice observed toward the neck. The colours in
 “ this experiment appeared much faint or fading from what
 “ they shewed before.



“ Some of the like coloured water, a little intermixed
 “ with aqua-vitæ, stood exposed to the like frost all winter,
 “ filled up to the neck of one of the ordinary glass vials,
 “ whereof the bottom is not convex, but turned in with a
 “ cone, to make it stand. In this there was no discernible
 “ separation of parts, and the glass did not burst, though
 “ frozen all over two or three several times; and that this
 “ glass was much thinner and weaker than the former: but
 “ neither did that ice freeze in it to that solidity, which ap-
 “ peared in them; also it dissolved or thawed sooner.



“ On the 8th of February, it freezing very hard, another
 “ experiment was made, in a more oval glass, of fine white
 “ metal, and strong, with a new tincture of cochineal in pure
 “ conduit-water, and exposed that night; whereupon, the
 “ next morning, the glass was found burst to shivers, rather
 “ more than the first; but the coloured parts were observed
 “ now equal, and most pleasantly to retire from all the cir-
 “ cumference by apparent degrees, almost discernible to
 “ the eye, drawing still into a more narrow and orbicular
 “ compals, and proceeding in the dye from rose to ruby, as
 “ it were leaving all the rest about it wholly crystalline,
 “ until the thaw, within a day and night after, made it likewise to soak forth in
 “ the same manner as was observed before in the first glass.



“ That same night, February 8, another strong but green
 “ glass-vial, about a foot in length, of the figure in the margin, being also filled with some cochineal-water, and a few
 “ drops of spirit of wine, almost to the top of the neck; it
 “ was also burst the next morning, and the coloured parts
 “ appeared discernibly enough, as severing and severing from
 “ the rest, though not so clear as in the former experiments,
 “ and with some difference also of parts and posture. The
 “ greater part was also in the middle of the bowl, another
 “ small parcel toward the neck, another near to the middle,
 “ and one more in the very top of it.

“ The like coloured water was put in a bowl of silver, but
 “ without any success of separation.

“ *Experiment in frost of water and turpentine-oil together.*



“ A glass-vial of the shape in the margin, filled above half
 “ with water, and the rest almost full with turpentine, which
 “ had been kept these twelve years and upwards, and the water
 “ never observed to freeze; but this winter, both in December
 “ and February, and the last time fiercest, the frost so
 “ swelling the ice, that it forced the turpentine forth of the
 “ glass at the top, by the sides of the cork stopple, though
 “ without breaking the glass; it was pretty to observe, as the
 “ thaw increased or abated, how the oil subsided and rose, and
 “ subsided again by degrees, until the ice being fully dissolved,
 “ made room again for the turpentine, that was forced out, and saved just to the
 “ mark of its former pitch.

“ *Experiment of frost in snow-water.*



“ In the body of a fair and strong white glass a lembick,
 “ there was about a quart of snow-water, which likewise
 “ froze and burst the glass; the body of that ice appeared
 “ not so solidly and crystalline and uniformly frozen, as that
 “ in the above-mentioned ovals, but had the resemblance of
 “ rays, or bright bristles or furzes shooting forth all along
 “ the glass from the midst within, most of them horizontally,
 “ except towards the roundish bottom.”

It being moved, that it might be considered to make a standard of cold, it was
 suggested by Mr. Rook s, that this might be conveniently done by observing the
 degree

degree of cold, which freezes distilled water, and by marking thereupon the expansion of the liquor in the weather-glass.

Dr. WILKINS mentioned, that he had raised a heat by a globe of fire, and felt the heat of it through gloves, and lighted a pipe of tobacco with it.

Mr. HOOKE produced a little engine for making the descent of quicksilver in glass-canes more discernible. He was ordered to prepare against the next meeting a tube of mercury, and to fit this instrument to it.

Some experiments were again made in prince RUPERT's powder-tryer, the success of which was, that with common powder, the ferrel being fixed, the body was raised but a very little; but with the like quantity of the same kind of powder, the ferrel being loose, the body was raised to the top. Both which experiments were tried twice with very near the same effect.

Mr. BOYLE produced the head of an alembic with a substance sticking to the inside of the glass in the form of a wood, produced from a mixture of oil of turpentine and sea-salt sublimed with a gentle heat.

Dr. GODDARD desired more time to prosecute the experiment of exhausting the air out of rectified spirit of wine.

Sir ROBERT MORAY produced three boxes with poison brought from Africa; which were ordered to be left with Dr. GODDARD, till the presenter should signify what they were.

The difference of eels being discoursed of, and Mr. HENSHAW mentioning the experience, which the keeper of the eel-boat upon the Thames had of this sort of fish, he was desired to make what inquiry he could of that person concerning their difference, food, &c.

Sir PAUL NEILE remarked, that the name of the hard eel was *baftling*.

The lord ASHLEY observed, that he had found eels living in muddy water to taste rank, and being put into spring water to acquire a sweet taste, but with some decay of their flesh.

The operator was ordered to provide some eels, and to put them into several waters, as river water, conduit water, &c. to see, in which of them they will thrive best.

He was likewise ordered to keep some fish in glasses with water, to observe how they grow there, it being alledged by Dr. WILKINS, that RONDELETIUS kept a fish in a glass with water at his house, which grew so big there, that it not only could not get out at the neck, where it was put in, but also wanted room to move in the glass.

The

The experiment of weighing the air in the compressing engine was again made, and agreed very near with the former; the difference only being of half a drachm, wherein the weight of the engine this day exceeded that of the other; there being now also some greater condensation of the engine than before.

The operator was ordered to measure how much the globe of the engine contained; and also to weigh exactly the engine before he compressed the air in it, and to have the counterpoise ready for the society; it being apprehended, that some of the oil in the vessel might spend itself at the emission of the air, and somewhat contribute to the diminution of the engine's weight after the air had been let out.

The business of propagating cider-fruit being again spoken of, the lord ASHLEY commended the red-streak, and especially the red red-streak, for yielding a very rich liquor of a long duration, and for being a constant bearer.

Mr. BOYLE moved, that some of the red-streak cider might be distilled, and the spirit of it compared with that of wine. The lord ASHLEY offered a bottle for the trial.

The secretary was ordered to write to Sir JOHN FINCH concerning the account, which he promised to send of poisons.

1661. January 6. At the meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| Dr. WILKINS, vice-president. | Dr. MERRET. |
| Sir PAUL NEILE. | Dr. WHISTLER. |
| Sir PETER WYCHE. | Mr. HILL. |
| Mr. AERSKINE. | Mr. HOSKYNs. |
| Mr. BALLE. | Mr. OLDENBURG. |
| Dr. GODDARD. | |

It was resolved,

That the fee of the secretaries for affixing the common seal of the society be an angel: And

That the fee of the amanuensis for every writing in parchment, to which the common seal of the society is affixed, be five shillings at least, and more, according as the writing may be larger, at the appointment of the council.

Dr. MERRET and Mr. HOSKYNs made some report of the books of the society; but a fuller report thereof was referred to the next meeting of the council.

It was resolved, that the commission for the printers be sealed at the next meeting, for which they were to be summoned by the operator then to attend the council.

Dr.

Dr. WHISTLER produced the form of the warrant used by the College of Physicians: and it was ordered, that Sir ANTHONY MORGAN be desired to fit that warrant for the use of the society.

Dr. MERRET was desired to prosecute his collection of the curious things of nature to be found in England, and to present the society therewith.

Mr. HOOKE was desired to take care, that the instrument for the measure of time, consisting of only one wheel with hollow camera's in it, moving either with sand or water for a good space of time, be made.

At the meeting of the SOCIETY on the same day,

Sir JOHN TALBOT was admitted: And

CHARLES lord viscount DUNGARVAN was presented by Mr. BOYLE, and elected.

The experiment of shooting with a wind-gun applied to the compressing engine was made, the success of which was, that the condensation being made near half in the globe, the bullet, shot at the distance of about twenty yards, made a very considerable dent in a door, sufficient to have killed a man. It was ordered, that this experiment should be repeated at the next meeting, and a particular account of it brought in writing by Mr. HOOKE.

Dr. MERRET having found by experiment, that water frozen, though exhausted, hath store of blebs, and more than unexhausted, Mr. HOOKE mentioned, that he knew a way of reducing water into ice without blebs. Whereupon he was desired the next frosty weather to try this experiment, and produce the effects of it before the society; as also to try, whether such ice, shaped into a lens, would serve for a burning-glass.

Mr. HOOKE's application of his little engine to a tube with mercury for the rendering of the ascent and descent of quicksilver more discernible, was referred to the next meeting.

He was desired to prepare, when the weather should serve, that standard for cold, which he proposed at the preceding meeting: And

To weigh a great receiver, both filled with air, and exhausted: and to do this both ways, by weighing it unexhausted first, and then by exhausting it first, and filling it with air again: As also,

To try, whether he could raise a thin and exhausted glass-bubble from the bottom of the receiver of the condensing engine towards the top, by condensing the ambient air of the bubbles.

Mr. BOYLE's representation of a wood in a glass-head from a mixture of oil of turpentine and sea salt being again mentioned, Sir ROBERT MORAY related an experi-

experiment of Dr. DAVISSON's to be found in his *Pyrotechny**, whereby he exhibited in a bolt-head the figures of many trees like fir, with various colours, grey and green, particularly from some turpentine put into the said vessel, and left for some weeks to digest.

Dr. THOMAS COXE mentioned, that a person of quality keeping in a glass some water drawn out of a well, in which a certain herb grew, persuaded himself, that he saw the figure of the like herb in the said glass.

Mr. BOYLE moved, that it might be tried, whether those figures, that are seen upon frozen windows in rooms, that have been warm, and are grown cool again, may not be reduced to a salt; and what kind of salt it may be, that hath this shaping nature.

Mention being again made of the propagation of cider, Mr. BOYLE moved, that it might be tried to make cider by infusion, by cutting good cider-apples into thin slices, and keeping them infused in water, repeating infusions of new apples to make it as strong as should be thought proper, and as the water is capable of receiving the virtue of such apples. Some of the members doubting, whether good cider could be made where common water is the basis, it was suggested by Dr. GONDARD, that this experiment might be made by infusing sliced apples in the first juice of apples expressed for the making a kind of double cider: as also, that ordinary cider might be put upon malt. Sir ROBERT MORAY moved, that ale or wort might be put upon apples.

Sir PAUL NEILE mentioned, that best cider might be recovered by putting it into ale at the working thereof, after the proportion of six gallons of such spoilt cider to twelve of ale.

It being desired, that experiments of this kind might be made, and Mr. BEAL appointed curator thereof; it was ordered, that the secretary should write to him, and recommend this business to his care.

Mr. BOYLE gave an account of the way used by the earl of CORKE to transport carps into Ireland; and he was desired to give it in writing.

He made mention of a little treatise of Monsieur PASCAL lately published in French, concerning the equilibrium of liquors and the weight of the air, and that some experiments were contained in it, not unworthy of trial. He was desired to have them extracted, and to present them to the society, to consider thereof, and to recommend them.

Sir ROBERT MORAY related, that he had seen at Chatham a new kind of ropes made of a West-India grass, stronger than ropes of hemp; experiment having been made in his presence, that a certain small hempen rope bore but 400 weight, and

* WILH. DAVISSON *Philosophia pyrotechnica sive Fasciculus Chymiatricus*, Paris, 1635, in 8vo.

broke

broke with a superadded half hundred; whereas a rope made of the said grafs of the same length, breadth, and weight with the hempen rope bore 600 weight, and broke with another half hundred.

It was thought fit, that it might be inquired into, what kind of twisting was used in making these grafs ropes; as also, whether they would bear salt-water, as well as those of hemp; and likewise, whether this grafs might not be improved for making of sails.

Sir ROBERT MORAY related, that at Chatham, in a certain room with shutters, which had not been removed for some time, upon their being shoved up, there fell down between the shutters and the wall a great number of flies, all alive, making four shovels full.

Mr BOYLE remarked, that swallows frozen up in ice, upon the thawing away of the ice, had been found alive, and flying about; and that a minister had sent a certificate of this to the king from Dantzic.

Sir ROBERT MORAY related, that the duke of YORK had spoken of it as his own observation, that a gun discharged at the time, when the wind is at east, gives a thumping noise, not at all sharp; it being usual for observers to conclude it to be such a wind upon the hearing of a gun shot off with such a sound. Sir ROBERT added, that his highness had delivered it as a common observation of the seamen, that the nights are lightfomer, when the wind is at south-east. He mentioned farther, that he had been informed also by his highness, that there were certain little springs at Croyden, which would run together, and make a stream for a certain space, and then slide under the ground, and afterwards break out again. Dr. WILKINS having acquaintance at Croyden, was desired to make a particular inquiry after this fact.

Dr. ENT moved, that it might be tried, whether a burning-glass will burn in the morning, as well as at noon and towards sun-set; he conceiving, that this burning depended in some measure upon the state of the air, and that coldness might be some hindrance to it. The experiment was referred to the summer season, when curators should be appointed for it.

Mr. HOOKE was desired to take care, that the wheel with hollow camera's in it, moving with either water or sand for a good while, be made.

January 13. At a meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. BALLE. |
| president. | Dr. WILKINS. |
| The lord BERKLEY. | Dr. GODDARD. |
| Mr. HOWARD. | Dr. WHISTLER. |
| Sir ROBERT MORAY. | Mr. HILL. |
| Sir PAUL NEILE. | Mr. HOSKYNES. |
| Sir ANTHONY MORGAN. | Mr. COLWALL. |
| Sir PETER WYCHE. | Mr. OLDENBURG. |
| Mr. AERSKINE. | |

VOL. I.

B b b

It

It was ordered, that Dr. MERRET and Mr. HILL do acquaint the secondaries of London with the power, which the Royal Society hath, of demanding bodies for dissection; and shew the said secondaries that part of the society's charter containing that power:

That the operator attend Sir ANTHONY MORGAN for the warrant of demanding a body for dissection, and carry it to the president to be signed and sealed: And

That Dr. CROUNE and Mr. COLWALL have a copy, to be taken by the amanuensis, of the experiments and observations to be made in Teneriffe, as they are registered in the society's Register-book, in order to consult with Dr. PUGH concerning the most convenient way of making them.

The report concerning the statutes was referred to the next meeting.

The president acquainting the council, that Mr. HOOKE had discovered to himself, Sir ROBERT MORAY, and Dr. WILKINS, an invention, which might prove very beneficial to England, and to the world, and that he had a good opinion thereof; but that it was necessary, that some experiments should be made for farther certainty, before it was made public, which would require some charges not so fit to be put upon the inventor; it was ordered, that the President, Sir ROBERT MORAY, and Dr. WILKINS have power to employ any sum under ten pounds of the society's money for the said purpose.

Mr. JONAS MOORE acquainted the council with Sir JOHN LAWSON's desire, that they would appoint a committee to examine Mr. GREATRIX's diving instrument, or to direct a good method of staying under water for a considerable time, to lay the foundation of the mole at Tangier, at the depth of four or five fathoms. Mr. GREATRIX being at the door was called in, and this matter being proposed to him, he submitted to such an examination, provided, that Sir JOHN LAWSON would be at the charge of having a new instrument made, and promise him such a recompence, as they should agree upon, in case it be certified by the committee, that it would perform the desired effect. It was thought fittest, that Mr. GREATRIX should provide a man, to perform what was expected from his engine.

The president and Sir ROBERT MORAY were desired to view the old instrument of GREATRIX.

The commission for the printers was sealed and delivered this day, but left by them with Dr. GODDARD to be better sealed at the next meeting, than could be done at this time by reason of haste.

At the meeting of the SOCIETY on the same day,

The lord viscount DUNGARVAN was admitted.

The operator was ordered to prepare a weather-glass with oil of anniseeds and distilled waters.

Mr. Hooke was ordered to have his tube for rendering the ascent and descent of mercury more discernible filled with mercury against the next meeting, and to bring it up in the meeting-room.

He was directed likewise to give an account in writing of the experiment made this day of weighing a great receiver exhausted of air, and filled with air :

To prepare the experiment of raising a thin and exhausted glass-bubble from the bottom of the receiver of the compressing engine to the top, by condensing the circumambient air : And

To repeat the experiment of shooting with a gun applied to the condensing engine, which failed this day.

Notice being given by Mr. BEAL in a letter to the secretary, that the water at Stamford in Dorsetshire afflicts the brewer to a third part, so that two bushels brewed in this water make full as strong beer, as three bushels in any other water in Dorsetshire and Somersetshire ; occasion was hence taken to discourse of the fitness and advantage of some waters above others in brewing. Mr. MATTHEW WREN related, that the waters of Charwell, by the observation of brewers, would make with a fifth part of malt less as good beer as the water of Isis. Dr. CHARLETON mentioned, that the brewers in Old-street prefer the water of St. Agnes le Clair for ale. He commended the water of Sambach near Brereton for the same purpose. Dr. CLARKE remarked, that the brewers did not esteem the water of the Thames on Southwark side so good for brewing as on the city side ; some of the society attributing the cause of this to the goodness, with which the water may be impregnated by passing through some earths ; others to the dissolving power, which some waters may have acquired by passing through mineral earths, whereby they are enabled to draw a stronger tincture. It was ordered, that the operator should collect the several waters in and about London ; and Mr. BOYLE, Dr. GODDARD, and Mr. HENSHAW were desired to examine them several ways, as by distillation, precipitation, &c. Mr. HENSHAW moved, that some oil of tartar might be used for precipitation, in order to discover what may be mixed with those waters. Dr. CHARLETON objected, that this way was not satisfactory, since mineral waters retained much, and precipitated little. Mr. BOYLE added, that this way of precipitating would not reach in many cases, though in some it might.

Dr. CHARLETON gave in a paper proposing certain experiments conceived by him not unworthy of exact trial concerning freezing and snow, some of which were recommended to be made ; as that of boiling flesh in snow-water, to see, whether it would look whiter, and eat more tender : that of distilling spirit of wine without fire, only by covering the body of the alembic with ice and snow, to Monsieur LE FEBVRE.

The manner of transporting fish from one place to another being spoken of, it was observed by Dr. CHARLETON and Mr. HOSKYNs, that in doing so, the fish must be continually kept stirring.

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The experiment of freezing swallows by lapping them up in paper, and by putting snow and salt about them, was ordered to be recommended by the secretary to Mr. BEAL: as also that of putting a dead and living swallow into two several glasses with no larger necks than they will go in by, and being well stoppt to expose them to the frost, to see, what figures will be made by their several transpirations upon the insides of the glasses in frosty weather.

Mr. WATERHOUSE produced a letter from Mr. CHILDREY, dated at Sarum, January 2, 1662, accompanying some observations of the weather for the year 1648; which were ordered to be filed up¹.

Mr. WATERHOUSE produced likewise a steatoma cut out of a young woman's breast, together with the description thereof, which was ordered to be read at the next meeting.

January 20. At a meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. MERRET. |
| Sir PAUL NEILE. | Dr. WHISTLER. |
| Sir PETER WYCHE. | Mr. HILL. |
| Mr. AERSKINE. | Mr. COLWALL. |
| Mr. BALLE. | Mr. HUSKYN. |
| Mr. PALMER. | Mr. OLDENBURG. |

The general and particular warrant to demand bodies for dissection, drawn up by Sir ANTHONY MORGAN, were read and approved.

It was ordered, that the general warrant be sealed by the president, and the other signed by him; and that a copy of both be entered into the journal of the council, as follows:

The general warrant.

“ By virtue of letters patents under the great seal of England, the president, council, and fellows of the Royal Society of London for improving natural knowledge, do hereby will and require all persons concerned, that from time to time dead bodies of the persons, who shall suffer death by the hand of the hangman, be delivered and taken by such person or persons, as shall by the said president, or his deputy for the time being, by any writing under his or either of their hands, from time to time be nominated and appointed to ask and receive the same for the use of the said Royal Society, in such and as ample manner and form, to all intents and purposes, as the like dead bodies have at any time heretofore been, or at any time hereafter may or ought to be, lawfully delivered or taken for the use and by the direction of the president of the College of Physic.

¹ Supplement to the Letter-books, vol. ii. p. 215.

" cians and company of chirurgeons of the city of London, by what name soever
 " the said two corporations, or either of them, are known. In witness whereof the
 " said president, council, and fellows of the Royal Society aforesaid have caused
 " their common seal to be affixed to these presents this 20th day of January, 1663."

The form of the particular warrant.

" These are to will and require you, that one body, either man or woman, executed at Tyburn, this present — being the — day of — such as the
 " bearer hereof R. S. shall choofe, be delivered unto the said — at the time
 " and place of the said execution, for the use of the Royal Society, he paying the
 " ordinary fees for the same. Given under my hand the day and year above-
 " written.

" To all, whom this may concern."

Signed by the President.

It was ordered, that the treasurer, Mr. HILL, pay the operator's bill from November 23, 1663, to January 20, 166 $\frac{1}{2}$: And

That the operator for the future bring in his bills weekly.

Dr. WILKINS was desired to speak with the operator as from himself, concerning his yearly salary, to try whether fifty pounds a year would content him, including the ten pounds allowed him for his constant attendance.

Dr. MERRET reported, that he had spoken with the secondaries of London, and given them an extract of the society's charter concerning the power given them therein for demanding of bodies to dissect; and that they would take notice of it publicly.

Dr. CHARLETON produced a box of anatomical instruments, for which the treasurer was ordered to pay him five pounds seven shillings and six-pence.

Dr. WHISTLER moved, that all the peculiar chirurgical instruments might be added to the anatomical, in order to make chirurgical operations, besides dissection.

At the meeting of the SOCIETY on the same day,

The president acquainted them, that, according to their charter, a warrant was issued for demanding a body for dissection, which was to be performed the next day after the execution in Gresham-College by Dr. CHARLETON, who had offered himself to open the muscles after a new method.

Sir ROBERT MORAY presented the society with a *Frutex marinus reticulatus*, which was ordered to be put up in the repository.

He produced a piece of wood petrified in a lough belonging to the lord viscount MASSAREENE in Ireland; which was likewise ordered to be placed in the repository.

Mr.

Mr. BOYLE gave an account of the distillation of the shavings of the *lignum fossilis*; and that it had afforded nothing but what was found in ordinary wood.

He presented the society with a linnet and a little snake, preserved already four months, entrails and all, without any change of the colour, in some spirit of wine made after a peculiar manner. Both the glasses, wherein they were kept, were ordered to be sealed up with wax, and put into the repository.

Dr. CLARKE mentioned, that there was an intention of preserving the whole body of a man with spirit of wine in a vessel well glazed; suggesting the usefulness of this method of preserving, that by this means there might be had in readiness for occasions an eye, hand, muscles, larynx, &c.

Dr. MERRET affirmed, that he had preserved the very entrails of a cat for twelve years past, though they were somewhat shrunk.

Mr. BOYLE observed, that he had a liquor compounded of spirit of wine and a little oil of turpentine, whereby not only the bodies of animals or the parts thereof might be preserved, but also it might be known what it is that comes away; which being such, that it will not mingle with the oil, falls to the bottom, and is found there.

He offered to preserve a hand and a larynx.

The paper presented at the last meeting by Mr. WATERHOUSE was read, containing the description of a steatoma cut out of the breast of a maid of seventeen years of age, caused by a bruise, when she was but seven years old^a.

Sir KENELME DIGBY read an extract of a Latin letter sent to him from Paris, dated January 19, 1664^b, wherein Dr. BORRICHIVS^c, a Dane, acquainted him, that one Monsieur SERVIER at Lyons had a certain portative engine, whereby the several tempers and inclinations of men might by the sole touch of the concerned person be known. Some of the members mentioning, that the like artifice was described by SCHOTTUS, Dr. MERRET was desired to consult that author, and to see, whether he agreed with this relation sent from Paris.

The secretary acquainting the society, that Mr. BEAL having upon his sollicitation inquired among the country-people, whether frozen eggs proved fecund, had sent him for an answer, that a whole company, men and women together, had confidently affirmed to him, that they proved so.

It being added, that by Mr. BEAL's account, all the eggs of the game of an exact cock master had been frozen the year before, and so frozen, that four of them broke, yet all the rest proved pregnant; and that, notwithstanding his objection, that they would have all burst, if they had been all frozen, the country-

^a Supplement to the Letter-books, vol. i. p. 119.

^b Letter-book, vol. i. p. 125.

^c OLAV BORRICHIVS, M. D. and professor at

Copenhagen. He was born the 7th of April, 1626, and died October 3, 1690.

He was a man of great learning, as appears from his writings
people

people positively affirmed, that they had been all frozen; Dr. ENT and Dr. MERRET suggested, that stale eggs having some vacuity, and consequently room for extension, would freeze without bursting, though new-laid eggs being full would, when frozen, break: whereupon Dr. GODDARD affirmed, that new-laid and even unlaid eggs had some cavity observed many times by himself.

Occasion being given to discourse of the diversity of tastes of meat, according to the variety of the food of animals, Dr. ENT moved, that it might be tried, whether a hen would eat musty, if she eat musty corn, as the milk of a cow will answer in taste to what the cow feeds on.

Dr. GODDARD was desired to bring in an account of the several ways of distinguishing eggs.

Dr. WILKINS being put in mind of the inquiry, which he was formerly desired to make of the springs of Croyden, Dr. MERRET mentioned, that they would rise once in two years after wet weather.

EDWARD SMITH, esq; was proposed a candidate by Dr. MERRET; and Sir JOHN LOWTHER by Dr. WHISTLER.

January 27. The COUNCIL met, at which were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| The lord BERKLEY. | Dr. MERRET. |
| Mr. CHARLES HOWARD. | Mr. HILL. |
| Sir ROBERT MORAY. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. HOSKYNs. |
| Mr. BALLE. | Mr. OLDENBURG. |

It was ordered, that the operator be paid twenty shillings for his work for the society, and bring in his bills weekly for the materials used by him:

That the president move this day the society to appoint a committee of physicians, who are fellows of the society, constantly to consider, what is necessary to be prosecuted in anatomy and chirurgery:

That Dr. MERRET bring in a list of the instruments necessary for chirurgery to be added to those of anatomy in the box lately provided for the society: And

That the porter be allowed three pounds a year for his constant attendance, to be paid him quarterly.

At the meeting of the SOCIETY the same day,

Mr. ROGER WILLIAMS was proposed candidate by Sir ROBERT MORAY, at the desire of Sir PAUL NEILE.

Sir

Sir JOHN LOWTHER was elected and admitted.

Mr. EDWARD SMITH was elected.

Dr. PELL gave notice to the society by Mr. HAAK, that whereas several astronomers made no mention of the sun's eclipse of January 18, 1661, and the almanack makers passed it over as not visible in England, he had seen it at Fobbing in Essex¹, which he accounted to have 51° 37' northern latitude, under a meridian not full 3 min. of an hour more eastward than that of London. Mr. HAAK was desired to request Dr. PELL to impart to the society the particulars of his observations concerning this eclipse.

Dr. CHARLETON was solemnly thanked for his pains in the late dissection of the muscle; and it was ordered, that all the physicians, who were fellows of the society, shall be a committee henceforth to order and manage dissections for the society upon every execution-day, and therein to divide the work among themselves, and to give notice what parts they intend chiefly to dissect and to treat of. And Dr. GODDARD was particularly appointed to take good care of the performance of this.

Col. TUKE brought in from Dr. THOMAS BROWN's¹ three papers sent out of Iceland concerning the quality and productions of that country, the eruptions of mount Hecla, and other vulcano's there, and other observables. The amanuensis was ordered to take a copy of the several matters contained in these papers².

Col. TUKE mentioned, that hogs would feed on the sea-side upon sea-fishes; but that because such food makes their flesh rank, they must, before they are killed, be scoured with some corn.

Mr. HOOKE was ordered to repeat the experiment of making a little glass-bubble swim in the air, by condensing the circumambient air; and to bring in an account thereof in writing: And

To try the experiment of putting some springs with a weight both in the rarefying and condensing engine, to see what force the different air hath upon them: and likewise to give in writing the experiment of weighing the air in the condensing engine.

The operator was directed to have an earthen pipe ready for the next meeting, and to fire it red-hot, and then to blow it on one side, to see, whether any flame will be blown out at the other end.

¹ Dr. PELL was rector of that parish, having been presented to the living in 1661. NEWCOURT's Repertorium, vol. ii. p. 269.

¹ of Norwich, afterwards knighted.
² They are extant in n° 7. vol. i. Prefs 44.

February 3. At the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. BALLE. |
| president. | Dr. GODDARD. |
| Mr. HOWARD. | Dr. MERRET. |
| Sir ROBERT MORAY. | Dr. WHISTLER. |
| Sir PAUL NEILE. | Mr. HILL. |
| Sir PETER WYCHE. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Mr. POVEY. | |

Dr. MERRET brought in the list of chirurgical instruments; and was desired to mark those of them, that are of chief use for the chirurgical operations intended to be made by the Society on dead bodies.

Sir ROBERT MORAY moved, that every one of the COUNCIL might think on ways to raise a revenue for carrying on the design and work of the Society.

Dr. WHISTLER suggested several things for that purpose; viz. that his majesty might be spoken to, that in every new grant something might be stipulated for the use of the Society: That if any thing should be found, that at present yielded no revenue to the king, the grant of it might fall to the Society: And that upon all philosophical books printed in England some imposition might be laid for the benefit of the Society.

At a meeting of the SOCIETY the same day,

JOHN earl of TWEEDALE, proposed by Sir ROBERT MORAY, was elected and admitted: And

Mr. ROGER WILLIAMS elected.

Mr. POVEY presented the Society with an East-Indian fan of tamarinds, retaining still its aromatic smell, after having been kept by him for six months, besides the long time of its transportation.

Mr. HOOKE's account both of the weight of the air in a large receiver 119 English wine pints, and of the proportion of the weight of the air to the weight of the water, was read; and the latter was ordered to be repeated.

It was ordered, that whoever made report of an experiment but once made, should repeat it, for the sake of more accuracy and certainty.

Mr. BALLE was desired to inquire of Mr. STREET, whether he had observed the sun's eclipse on the 18th of January of this instant year.

VOL. I.

C c c

Mr.

Mr. BOYLE presented the Society with a little bird, preserved for several months in oil of turpentine; by which liquor, as he observed, bodies might be so kept, as that it may also appear what it is that comes away from them; there being found a liquor at the bottom quite distinct from the oil; which subsiding liquor being examined, would shew the quality of the matter separated.

Mr. BALLE acquainted the Society, that Mr. DARLINGTON had found a metal yielding a glass, that transmits rays without burning. He was desired to make farther inquiry into it.

Monf. VOSSIUS* communicated a relation of a child taken in Lithuania among bears in a bear-hunting, and then at the court of the queen of Poland, where endeavours were used to reduce the child to some humanity, whence it seemed to have altogether degenerated by its long conversation with wild beasts. This relation was attested by a French gentleman, as an eye-witness, accompanying the two sons of the marshal DE GRAMMOND. Sir ROBERT MORAY was desired to make farther inquiry into the fact by a letter to Dr. DAVISON, living in those parts.

Mr. HOOKE was ordered to make the experiments of compressing water and glass, as also that of the swimming glass bubble, against the next meeting.

He mentioned, that he had exposed springs to the free air; but that, notwithstanding a considerable alteration in the air, he had not found any alteration in the springs.

Mr. BOYLE suggested, that a spring might be bent to a certain degree, and put into a cylindrical glass, with ice and snow about it, to see what alteration would be wrought upon the spring.

Mr. HOOKE was ordered to try springs with appendent weights, both in the rarefying and compressing engine, to see what effects the rarefaction and condensation of the air produced in springs.

He related, that he had taken a piece of ice, and having shaped it into a lens, had found, that though it cast the figure of the sun upon his hand, yet it yielded no heat that was sensible. He was desired to try with it, when there was an opportunity in frosty weather, a lenticular glass, whether it would yield any heat in such a season.

Mr. BOYLE's discourse concerning weather-glasses was read in great part; and the communication of it being desired, it was answered by him, that he intended shortly to publish it in print.

* ISAAC VOSSIUS, afterwards canon of Windfor.

February

February 10. At the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. PALMER. |
| president. | Dr. GODDARD. |
| Mr. HOWARD. | Mr. HILL. |
| Sir ROBERT MORAY. | Mr. COLWALL. |
| Sir PAUL NEILE. | Mr. HOSKYNES. |
| Sir PETER WYCHE. | Mr. OLDENBURG. |
| Mr. AERSKINE. | |

It was ordered, that the president move the SOCIETY, to demand again a body for dissection; as also to consider of what may contribute to diving.

It was resolved, that the form for the summons of the fellows of the Society for a dissection be in the following manner:

“ You are desired to take notice, that there will be an anatomical administration
“ at Gresham college, to begin at —— day, at ten of the clock precisely.”

The ways of raising a revenue for the Society being again considered of, Mr. HOWARD mentioned the soliciting a grant from the king of such lands, as were left by the sea. Sir ROBERT MORAY suggested, that his majesty might be moved to grant to the Society the reversion of the mastership of the Savoy. Sir PAUL NEILE moved, that the king might be spoken to, to confer such offices of the courts of justice, or the custom-house, as were in his majesty's grant, upon some of the members of the Society, for the use of the whole.

It was desired, that those members, who were lawyers, would inform themselves about the vacancies and reversions of the places of the law-courts; and Mr. COLWALL about places of the custom-house, &c.

Mr. HOOKE being called in, and desired to suggest some experiments, that might be acceptable and useful to the public, suggested, that the experiment of land-carriage, and of a speedy conveying of intelligence, might be considered of.

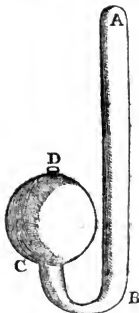
At a meeting of the SOCIETY on the same day,

The experiment concerning the weight of air, and the proportion of the weight of air to that of water, was repeated; of which Mr. HOOKE was directed to give an account in writing at their meeting. It was as follows:

“ A large receiver, holding by measure 119 English pints, was, after a gage
“ (bye-and-bye to be described) hanged into it, closed up with a small stop-cock,
“ and the air was pretty well exhausted by the rarefying engine. Then, the cock
“ of it being well stopped, so as to keep the air from re-entering it, was very well
“ counterpoised in an exact pair of scales: then the stop-cock was returned, and

* Original Register, vol. iii. p. 12.

“ the air admitted; so that the water returned into the longer shank of the gage,
 “ within $\frac{1}{4}$ of the top, and the receiver was found to be grown considerably hea-
 “ vier: the weights, that were added to the counterpoise, to bring it again to an
 “ equilibrium, amounting to 2 ounces, 1 drachm, 15 grains, averdupoise, almost.



“ The gage was made of a small pipe of glass, of the
 “ shape represented in the figure A, B, C. The side A B
 “ was an even cylindrical pipe, full of air, closed at A;
 “ and the ball C was full of water, and the orifice D was
 “ left open, to let the air in or out, according to the exi-
 “ gency of the experiment; namely, as the ambient air
 “ in the receiver was rarefied, the air contained in the
 “ cylinder A B rarefied itself likewise, and broke out into
 “ the receiver through the water in C, so that the air in
 “ A B was always of the rarity with the ambient air in
 “ the receiver: but when the air was admitted into the
 “ receiver, it forced the water contained in C into the
 “ cylindrical pipe A B, and filled twenty-three parts of
 “ twenty-four of it, leaving only a small bubble of air
 “ at the top, that filled $\frac{1}{4}$ part of the whole cylinder:
 “ whence we collect, that there was only $\frac{1}{4}$ part of the
 “ air, that had a little before filled it, when it was weigh-
 “ ed in the scales.

“ We weighed likewise a pint of water with the same accurate beam, and found
 “ it to weigh $18\frac{1}{2}$ ounces averdupoise; so that the weight of the water, that filled
 “ the whole receiver, amounted to $2105\frac{1}{4}$ ounces averdupoise: from which weight
 “ if we deduct $\frac{1}{4}$ part, we shall have very near $2017\frac{1}{4}$ ounces averdupoise, for the
 “ weight of a parcel of water, equal in bulk to the parcel of air admitted into the
 “ receiver, which weighed $2\frac{1}{4}$ ounces: that is, the weight of the air, to the weight
 “ of the water, is very near as 1 to 949 $\frac{1}{2}$.”

The president produced a letter, written to him by Mr. FLINT, from Run-
 ton in Norfolk, giving some account of the islands of ice floating in the Iceland
 sea, of an incredible profundity; and desiring also a thermometer for his corre-
 spondent there. It was ordered, that a couple of thermometers should be made
 ready for that purpose, and carefully put up by the operator against the next
 meeting.

Sir PETER WYCHE presented the Society with the Life of DON JOHN DE CAS-
 TRO, translated by him out of the Portuguese into English.

Dr GODDARD's account of eggs, and the differences between new and stale, and
 the signs of each arising thence, was read, and ordered to be registered*, as
 follows:

* Original Register, vol. iii. p. 8.

“ Eggs of hens are in frequent use for diet, both in mixture for great variety of made dishes, and also alone in the shells or out of them; which, since upon long keeping they become rotten, and contract so horrid a putrefaction, in reason they must be best, and to sense they are found pleasantest, that are newest: therefore the difference between new and stale, and the signs of each arising therefrom, have been sought after and taken notice of; some of which are,

1. “ On the outer superficies of the shell, a mealiness or immunity from gloss or shining, except it hath been soiled, and especially with any fatty substance; which holds in all new-laid eggs, as the contrary doth in stale, though kept from such soiling as before mentioned.

2. “ From the cavity between the shell and the membrane or skin involving the white, a good estimate may be made of the newness or staleness of an egg. Perhaps some new-laid egg may want it (as some think none have it when first laid) but to be sure it hath been found in others of the newest laid. If this cavity be supposed to be always about the great end of the egg, then the seeking and missing it there in some new-laid eggs may have given occasion to deny it to be in such; whereas it is certain, that many times it is seated on the side, far from the greater end, and sometimes about the smaller; so that if this were not attended it doth not from hence appear, that any egg, though never so new, should want it. But as to the differences of this cavity in new and stale eggs, there are two, magnitude and figure: for the first, it is certain that, new-laid eggs have the least cavities, which, upon keeping, still grow bigger, till they reach to the yolk, and leave it bare on the part next to it, as appears in such an egg boiled hard. And in summer time, or hot weather, the cavity enlargeth more in a day or two, than it doth in a far longer time in winter or cold weather, as in all other differences an egg doth stale faster.

3. “ The figure of the cavity in a new-laid egg is spherical, so deep sometimes as makes near an hemisphere, like an impression of half a pea, or a round body of that bigness: as the egg grows staler, and the cavity larger (as was mentioned before) so it becomes also of a more irregular figure, spreading and growing in part to some rising or convexity, for the most part in the middle; and sometimes spreading large in circumference, without proportionable depth, so as to be convex, and parallel to the shell, only leaving a space between it and the white; though otherwhile (as was said) enlarging itself downwards, and reaching to the yolk: all which may be seen in hard boiled eggs, the part of the shell against the cavity being discovered against the light, and warily taken off.

“ For the more certain judging of the newness of an egg by the cavity, the magnitude and figure are both to be taken together; for though all new-laid eggs have smaller cavities, yet it is probable, that they are not all of the same exact bigness, but that they are all of a more regular spherical concave; because it hath been observed, that one egg with a cavity somewhat larger, but withal deeper and more regular, hath been better tasted, and by all other signs newer
“ laid,

“ laid, than another that had a cavity rather lesser, but withal less regular as to the spherical figure.

“ The cavities of eggs may be seen, and their bigness distinguished through the shells, by holding them up between the eye and a quick light, shadowing with the hand, that the light fall not on the side toward the eye: and thus in a raw egg the cavity appears a darker, in a boiled one a lighter spot, than all the rest of the egg.

4. “ From appearances in the whites of eggs some signs of new and stale ones may be made out, and that by looking through the shells; the whites in new-laid eggs being most transparent when raw, and most opaque when boiled; but the thickness more than ordinary, and the equality of the thickness of the shell, making a cloudy appearance, upon that account alone doth often hinder from distinguishing at certainty in this way.

5. “ The white of a new-laid egg raw being let out, upon breaking the shell, a good part of it is fluid, thin, and running like water; in a staler egg it appears all of a like consistence.

6. “ Of the like white boiled, except it be very hard, that next the yolk is fluid, and like whey of milk, while the rest is consistent: of a staler egg boiled, the white is all uniform to sense: the fluid part like water in the raw egg, and whey in the boiled, is probably the same in both, viz. the inner part or region of the white, which by curious anatomists and observers of eggs and chickens in the shell, is not only accounted different from the outer region, but separated by a membrane, though invisible, by reason of the thickness and transparency thereof; which upon long keeping may be dissolved, and the several substances thereupon mix and be confounded together.

7. “ In whites of eggs boiled to a consistence, the colour of those new-laid is milky white, which renders them less transparent, as was noted before: of those that are stale, not so white, because more transparent; the former more resembling the curd of milk, the latter some stiff jelly. This holds generally in hens eggs, though sometimes, yet very rarely, an egg with a transparent white upon boiling (which by the cavity and all other signs, should be new-laid) hath been observed, perhaps from some difference in the feeding of the hen; as in pikes and other fish, that are well fed, the flesh is more milky, white, and firm; less firm and more transparent in the rest. In eggs of geese and ducks, the whites are less milky white, and more transparent in the newest laid, than those of hens; yet the newer laid of them come nearer to hen-eggs.

8. “ The whites of new-laid eggs harden sooner upon boiling than those of stale; so that of a parcel of eggs boiled together, the hardest may be chosen for the newest laid.

“ New-

" New-laid eggs are often observed to split or crack their shells in boiling
 " which may very probably be from the smallness of the cavity, not giving room
 " to the meat to dilate within the shell.

9. " The posture of the yolk doth discover considerably, whether the egg be
 " newer or staler; that is, if it be in or near to the middle, it is a sign of the new-
 " nefs of the egg: and the farther it is removed from the middle, and the nearer
 " to any part of the shell (which oft-times it even touches) it infers that egg to be
 " the staler: this is from the weight of the yolk settling down upon long lying
 " (whence by shogging it at the great end an egg may be made to stand on it,
 " upon a plain without cracking the shell) but hence it appears, that if stale eggs
 " be often removed, or especially if turned on purpose, this sign must fail.

10. " The taste of the yolk (for the white hath none sensible or considerable)
 " may be accounted a sign of a new-laid egg, which is certainly much more plea-
 " sant than that of a stale one, to those that are accustomed to taste eggs; but this
 " cannot be described. But all eggs of a like newness have not equal sweetness
 " in taste: which may probably vary upon the feeding of the hen; as the milk of
 " cattle or other creatures (to which the yolk of the egg hath analogy) is known
 " to do upon their feeding within a day, or a short time; and the flesh of all crea-
 " tures in use to be eaten, in a longer time.

" The paler or deeper colour of the yolk is no sign of the newness or staleness
 " of the egg: it is commonly (and very probably asserted) that the difference is
 " from the age of the hen; that is, the younger hen lays the egg with the paler
 " yolk; and the elder, with the deeper coloured. As little is to be inferred from
 " the colour of the shells, which of some eggs is of a pure white, of others much
 " different towards yellow; whereof those of this latter colour are said to be laid
 " by fat hens: to be sure in both kinds, as to the colour of yolks and shells, eggs
 " are to be found of the same newness."

Dr. GODDARD mentioned, that the dog formerly cut of the spleen by Dr. CHAR-
 LETON was dead; and being opened, was found swelled by a considerable quan-
 tity of purulent matter, caused undoubtedly by the effusion of blood, occasioned
 by the not well closing of the vessels cut from the parenchyma of the spleen. It
 was ordered, that the experiment be repeated with more care by Dr. CHARLETON.

Mr. BALLE gave some account of what Mr. STREET had calculated of the sun's
 eclipse on the 18th of January last, viz. that it should begin at 7 h. 39' 59" in the
 morning, and the sun be covered about a tenth part.

Mention being made of the conjunction of Mercury with the sun on the 25th of
 October following, it was ordered, that Dr. GODDARD, Dr. WHISTLER, Mr.
 BALLE, and Mr. HOOKER should prepare for the observation: as also, that some of
 the curious in the English plantations of America, as Mr. WINTHROP in New
 England, Mr. NORWOOD in Bermudas, Capt. SILAS TAYLOR in Virginia, and Dr.
 HENRY STUBBE in Jamaica, should be desired to make the said observation in
 those parts.

Sir

Sir PAUL NEILE moved, that observations might be made of the sun's figure in its rising and setting about Covent-Garden, and at Deptford. The president was desired to observe in Covent-Garden, and Mr. EVELYN at Deptford; or if the latter could not conveniently do it himself, to engage some persons there or at Greenwich to do it.

Mr. HENSHAW read the history of *lignum fossile minerale*, as he had translated it out of a treatise in Italian on that subject by FRANCESCO STELUTI. It was ordered to be laid up, together with the printed book presented by him to the society from Sir ROBERT PASTON.

Mr. SOUTHWELL shewed the society a part of the thorny safeguard of an American pumpkin, brought from America by the lord WINDSOR; and related, that with such a substance the whole outside of that fruit was so surrounded, that the birds, which otherwise would eat it all by reason of its sweetness, could not come at it. It was delivered to the operator to be put into the repository.

The president moving it to the society, whether they would have a body again to dissect at the next execution, it was ordered, that a warrant should be drawn up for demanding a body; and that the physicians of the society formerly appointed, should meet and consult, by whom and how the dissection was to be managed.

Mr. HOOKE was ordered to make the following experiments at the next meeting. 1. To immerge a ball in water, and to convey into it a continual stream of air. 2. To try the strength of several kinds of wood, as to bending, toughness, &c. and to break them several ways, both length-wise and cross-wise. 3. To try springs both in the rarefying and compressing engine.

The president moving it to the company, that the business of diving might be taken into consideration as a thing, that would be, at that time especially, very acceptable, if it could be reduced to practice, it was ordered, that his lordship himself, Sir ROBERT MORAY, Sir WILLIAM PETTY, Dr. WILKINS, Dr. GODDARD, Mr. OLDENBURG, and Mr. HOOKE should be a committee for that purpose, and meet at the president's house on the Saturday following about ten of the clock, and make a report on the Wednesday following.

February 17. The COUNCIL met, at which were present

The lord viscount Brouncker,
president.
Mr. HOWARD.
Sir ROBERT MORAY.
Sir PAUL NEILE.
Sir PETER WYCHE.
Mr. BALLE.

Dr. GODDARD.
Dr. WHISTLER.
Mr. PALMER.
Mr. HILL.
Mr. COLWALL.
Mr. HOSKINS.
Mr. OLDENBURG.

The

The committee appointed February 3 for examining Mr. BALLE's accounts reported, that they had examined them, and found Mr. BALLE to have discharged his trust with care and fidelity : Whereupon it was

Ordered, that the society should that day at their ordinary meeting be acquainted therewith, in order to return thanks to Mr. BALLE.

It was ordered also,

That the president be desired to move that afternoon to the society the business of dissecting a body :

That upon Sir Peter WYCHE's moving, that Dr. CHARLETON's lectures upon the muscles might be printed, Dr. CHARLETON should be desired to give in the said lectures to the council for farther consideration and order concerning them :

That Mr. HOSKYNs bring in at the next meeting of the council a report in writing concerning the statutes of the society :

That Mr. HOOKE set down in writing and produce to the council his whole apparatus and management for speedy intelligence : And

That Sir ROBERT MORAY and Mr. EVELYN give a visit to Col. BLUNT, and confer with him concerning the improvement of land-carriage.

At the meeting of the SOCIETY the same day,

Mr. WILLIAMS was admitted.

The experiment of applying a bell or hoghead with air under water by means of two buckets, was tried in little, and succeeded. Whereupon Mr. HOOKE was ordered to get a model made against the next meeting of the bag, which was to be about the body of the diver for continual inspiration ; which bag being emptied, he was to repair into the bell, as a magazine for a new supply of air to fill the bag with.

For seeing under water, Mr. HOOKE proposed a pair of deep convex spectacles.

It was ordered, that the secretary produce at the next meeting Mr. ROCHEFORT's account of diving : And

That a full-grown dog be provided by the operator for cutting out the spleen, to be performed by Dr. CHARLETON at the next meeting.

Sir ROBERT MORAY's directions for the observing of the conjunction of Mercury with the sun on the 25th of October 1664, were read, and ordered to be sent to Bermudas and the other places formerly named, together with the letter drawn up by the secretary, and read before the society.

It was ordered, that the secretary should let Dr. WALLIS know, that it was the desire of the society, that he should write as from himself to Monsieur HEVELIUS of Dantzick, and to recommend to him the observation of the conjunction of Mercury with the sun.

Mention being made of Mr. HORROX's^p papers concerning celestial observations, Sir PAUL NEILE promised to produce some of them : and Dr. CROUNE was desired to write to Mr. TOWNLEY, who had a considerable number of Mr. HORROX's papers, to communicate them, in order to their being made public.

Sir ROBERT MORAY mentioning, that Monsieur HUYGENS desired to know of what size the tubes were, in which the experiment of the quicksilver remaining suspended so high above the ordinary station was made, and whether they were perfectly cylindrical, or had the orifice somewhat smaller than the rest ; the president and Mr. BOYLE were desired to repeat the experiment, and to observe the size and orifice of the tube for the satisfaction of the queries above-mentioned.

It was ordered, that a summons be drawn up by the secretary, and sent by the operator to the physicians of the society to meet together on the Saturday following, the 20th of February, about three of the clock in the afternoon in Dr. GODDARD's lodgings, to consult about the managing of the next dissection. The summons was accordingly drawn up, and delivered to the operator.

Mr. BOYLE mentioning, that the committee of physicians formerly appointed for anatomical administrations might be desired to consider of and bring in an account of the *Defiderata* of anatomy, it was ordered, that they should take this matter into their consideration, and give an account of it to the society.

He suggesting, that Dr. CROUNE had considered of the proportions of the bones and other parts of animals as to their length and weight, the society desired the doctor to bring in his observations on this subject, which he promised to do.

Dr. CHARLETON mentioned, that BELLONIUS and LEONARDO LA VINCI had done something upon that subject.

The president acquainting the society, that Mr. BALLE had given up his accounts to the council, and was by them found to have discharged his trust faithfully, the society gave Mr. BALLE their thanks for his care and pains taken in his treasure-ship.

Sir ROBERT MORAY produced two ribbands dyed with a colour extracted out of a yellow wood of Jamaica ; and was desired to give some of that wood to Mr. BOYLE for farther trial.

^p JEREMIAH HORROX, born at Toxteth, a small village near Liverpool in Lancashire, and educated at Emanuel College in Cambridge, began about 1633 to apply himself to astronomical observations.

A letter from Mr. BEAL to the secretary was read concerning Capt. JAMES's voyage and wintering in Charleton island in Hudfon's Bay : as also some observations of his own about the art of tanning, which were ordered to be registered*, as follow :

" Now I shall give you some brief account of the art of tanning and dressing of dog-skins. The skins of the biggest mastiffs are fittest to be tanned for boots or shoes, or thick riding gloves, and are held to be stronger and have a finer grain than any Spanish or Barbary leather ; but they are cold and moist, fittest for summer ; and old fame reports them to beget the palsy. Hunting-hounds and grey-hounds and water-spaniels yield the softest and most limber and pleasant leather : the skins of lesser dogs are not so fit to be tanned, as to be dressed white for gloves.

" In tanning, lime it quick, viz. let it lie not above a fortnight or three weeks in lime, taking it out of the lime-pits once every day for an hour or more all these three weeks : then put it for a week in a pit of weak ooze (which is the water, in which the bark of oak lies bruised) taking the skins also once every day (as before) out of the ooze for an hour, &c. Then it should be tanned up in the strongest ooze : the quicker it is tanned, the better it is and stronger : by long tanning it rots. If it lie three weeks or a month in the strongest ooze (taking it out but once a week) 'tis then best to take it up as soon as it is tanned enough. Then hang it on poles, as plain as may be, till the sun and wind dries it, which may be in two days of good weather : if it should rain, it must be dried within doors. If the horn (as they call it) be quite out, viz. if it be not stiff and horny, you may take it out at the third laying in this strong ooze. If some parts do obstinately continue horny, the horn may be taken out thus ; take for each skin half a pound of allum, and a like quantity of salt, dissolve it in fair water, and bathe the horney parts often in it, in some earthen or tin'd vessel. This is necessary to be done to leather, that is tanned for gloves, not for boots or shoes.

" To dress white for gloves, it must be better limed, viz. lie a week longer in the lime : after it is taken out of the lime, it must lie in warm water mingled with bran ; so let it lie three days together without stirring it ; then let it lie one day in the infusion of allum and salt above-mentioned ; then dry it smooth upon poles.

" Cat-skins are dressed as dog-skins ; but if you would save their furs, you must not put them in lime at all (but in fair water, in which bran is boiled, and then cooled before you put the skins in) in which they must lie for two or three days. So also squirrels-skins, and thus are dressed seal skins with the hair on, for the covers of saddles, &c. in which care must be had, that the liquor, in which your bran is, be not too warm, but cooled thoroughly, before the skin be put in. A boar's skin will be thicker than a bull's skin, and cannot be tanned limber, but

* Original Register, vol. iii. p. 14.

" is always horny. All castling skins may be drest (as above) white for gloves.
 " If dogs-skins be not tanned very quick, as above directed, they will not hold any
 " colour in perfection.

" Some cat-skins (as I am told by a very great wit) yield a very rich fur; I
 " take it, it was of fox-colour and perfect fables mingled, and rather in dapples
 " than undulate as the Cyprian. If any of these skins should have a dead tanning
 " (so they call a slow tanning) as calves-skins, they will be so rotten, as not to
 " hold stitch.

" To take out the allum afore said, mingle the yolks of eggs and oatmeal in fair
 " water, and in that liquor let the leather lie a few hours, and then wash it well
 " therein, and so dry it. My man intends to try his skill upon eel-skins and
 " conger-skins, which without dressing are much stronger than any known leather,
 " and may be fit for pumps, as lesser eel-skins for flails."

It was ordered, that the lawyers of the society be a committee for perusing the statutes of England, in order to extract from thence whatever had been ordered therein concerning manufactures, and the abuses and frauds committed therein.

Mr. WILLIAMS was desired to bring in his observations of the curiosities and rarities of England.

Mr. HOOKE was ordered to prepare against the next meeting three vessels, one with common air, another with exhausted air to a certain degree, and a third with compressed air to the like proportion; and to try in them some animals, to see how long they would live in such vessels.

He was put in mind of the experiment of trying the strength of several kinds of wood; upon which Mr. BOYLE suggested, that in the trial notice might be taken of the time, when the wood was cut.

February 24, being Aſh-Wednesday, the council did not meet; and by reason of the anatomical administration of the society happening to be on this day, the meeting was adjourned till the Wednesday following, the 2d of March.

March 2. At the meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Dr. WHISTLER. |
| Sir PAUL NEILE. | Mr. PALMER. |
| Sir PETER WYCHE. | Mr. HILL. |
| Mr. AERSKINE. | Mr. COLWALL. |
| Mr. BALLE. | Mr. HOSKYNs. |
| Dr. WILKINS. | Mr. OLDENBURG. |

Mr. HOSKYNs brought in writing the report of the committee for reviewing the statutes of the society, viz.

" The 19th of December, 1663.

" At a committee for reviewing the laws.

" This committee is of opinion, that it is the interest of the society to have no complete body of laws; but that such orders be from time to time made, as the state of affairs shall necessarily require; and that the laws already made be kept private.

" JOHN HOSKYNs."

It was ordered upon this report, that in pursuance of an order of the council of December 21, the same committee bring in their sense upon particular statutes.

The king's reception being again considered of, it was ordered, that Sir ROBERT MORAY, Dr. WILKINS, Dr. GODDARD, Dr. MERRET, Dr. WHISTLER, and Mr. HILL be a committee to prepare such experiments, as might be fit for that purpose, and do meet accordingly on Mondays in the afternoon at Gresham-College.

It was ordered, that all those of the society, who should print any books of a philosophical nature by order of the society, be desired to own themselves in the title page fellows of the society.

A motion being made by Mr. HOSKYNs, that the society might print and vend to their advantage the books to be printed by any of their fellows, and by their order; it was resolved, that this proposition should be again considered of, when any book of note should be offered to the press by any fellow.

At the meeting of the SOCIETY on the same day,

The experiment with birds put in common, rarefied, and compressed air being made again, and it being found, that the bird in the common air was well; that in the rarefied, panting, and that in the compressed air, dead, the last was opened, but no water found therein: which since some of the members thought an argument against the bird's being drowned, it was ordered, that the experiment with the bird in the compressing engine should be tried the third time, putting the bird in a little cage, at the next meeting.

Mr. HOOKE produced his bellows to be used under water for taking in air; but proposed withal another way conceived by him to be better and safer than that with bellows, viz. with two cylinders open at one end, and having two pipes, by which the air is taken out of the one and put into the other. It was ordered, that two such cylinders be made, and when ready, a waterman hired to try the experiment.

It was ordered, that Dr. CHARLETON cut the spleen out of a dog at the next meeting; and that the operator provide a dog for that purpose.

The

The physicians of the society, who had employed themselves in the late dissection of an human body, viz. Dr. GODDARD, Dr. CHARLETON, and Dr. CLARKE, received the thanks of the society for their diligence and pains; and were desired to continue the same upon the like occasions, and to consider among themselves from time to time what to prosecute, and how to divide tasks.

Sir ROBERT MORAY produced a paper, containing the description of a way invented by his highness prince RUPERT to make hail-shot of different sizes; which was read, and ordered to be registered¹.

Dr. PELL made known his desire to the society by Mr. HAAK (himself being hindered from being present) that the sun's apparent meridian altitude might be observed on the 10th and 11th days of this month of March, in order that the society might be enabled by their own observations to examine other men's predictions of the day and hour of the sun's entrance into Aries. Hereupon it was ordered, that Sir ROBERT MORAY, Mr. BALLE, Mr. HENSHAW, and Mr. NEILE should be curators of this observation to be made on the top of Westminster-Abbey on the days above-mentioned, taking in the 8th and 12th days.

Upon a second consideration of Monsieur HEVELIUS's Latin letter to Mr. OLDENBURG from Dantzick, January 4, 1662, N. S.² desiring, that the Royal Society would transmit to him a Latin translation of a manuscript in the Persian language, containing a catalogue of the six stars by ULUG BEIG³, an eastern prince and astronomer; it was ordered, that Dr. WILKINS should be desired to write to Dr. WALLIS to procure the said translation, in order to be sent to Monsieur HEVELIUS.

March 9. At the meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WHISTLER. |
| president. | Mr. PALMER. |
| Sir ROBERT MORAY. | Mr. HILL. |
| Sir PAUL NEILE. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Dr. WILKINS. | |

It was ordered, that any three or more of the council, who should first meet on the Wednesday following at the usual time, should consider of an order to be drawn up and offered to the council concerning the power, which might be given to a committee of the council, to discourse of and prepare matters concerning the society, against the time that a quorum of the council be assembled.

Sir PAUL NEILE mentioning, that Sir ELLIS LEIGHTON had some proposals to make for the benefit of the society, but desired to confer privately with some few

¹ Original Register, vol. iii. p. 16. It is printed in Mr. Hooke's *Micrographia*, p. 22.

² Letter-book, vol. i. p. 114.

³ He was nephew to TAMERLANE, and flourished about the year 1436.

members about it, it was ordered, that the President, Sir ROBERT MORAY, Sir PAUL NEILE, Mr. AERSRINE, and Dr. WILKINS, be empowered to meet Sir ELLIS, and confer with him from time to time, and act in the name of the council for the benefit of the society in things, that required secrecy and expedition.

It was moved, that the king might be desired by the President, Sir ROBERT MORAY, and Sir PAUL NEILE, to give a rule to the two secretaries of state, that all the propofals, that should be made concerning mechanical inventions, be referred to the council of the society, to be examined by them, whether they were new, true, and useful.

Dr. WILKINS made a report of what the committee for preparing experiments for the king's reception had begun to do, viz. dispatched the artificial eye; contrived some optical pictures, and devised how to cast a picture upon a wall in a light room; moving withal, that Dr. MERRET and Dr. WHISTLER might be exhorted to meet constantly with the committee.

Sir ROBERT MORAY moved, that the council would make it their business to get an interest in Chelsea College*, and to procure the reversion thereof. Whereupon it was ordered, that the archbishop of Canterbury* should be spoken to by the bishop of Exeter*, Dr. WILKINS, and Dr. PELL, to give his consent to have the said college applied to the use of the society: as also, that Sir ROBERT MORAY make farther inquiry of Mr. COLE concerning the terms of parting with the interest, which he had in it.

* This college had been founded by king JAMES I. for the defence of the true religion established within the realm, and for the refuting of errors; and heretics repugnant unto the same; and the members of it were incorporated by the name of the Provost and Fellows of the college of king JAMES in Chelsea near London, who bestowed on it by his letters patents the reversion of good land in Chelsea, then in possession of CHARLES earl of NOTTINGHAM, who had a long lease thereof; together with a capacity of receiving from his majesty, or any of his subjects, lands not exceeding in the whole the yearly value of 3000*l*. The fabric of this college was begun on a piece of ground called *Teamflor*, containing about six acres, and then in possession of the earl of NOTTINGHAM, who granted a lease of his term therein to the provost at the yearly rent of 7*l*. 10*s*. King JAMES laid the first stone thereof, and gave all the timber requisite thereto out of Windsor Forest; but the building was never completed, according to the design. Dr. MATTHEW SUICLIFFE, dean of Exeter, who conveyed to this college farms to the value of 300*l*. a year, was appointed by the king, May 8, 1610, provost of it; and the fellows of it were seven-

teen divines of eminent learning, to whom were added WILLIAM CAMDEN, clarencieux, and JOHN HAYWARD, L. L. D. as historians for transmitting the affairs of church and state to posterity. In the parliament, which met at Westminster, February 19, 1634, and sat till July 23, 1610, an act was passed enabling the provost and fellows to dig a trench out of the river Lee, to erect engines, water-works, &c. to convey water in close pipes under ground unto the city of London and suburbs thereof, for the perpetual maintenance and sustentation of the said provost and fellows, and their successors, by the rent to be made of the said water so conveyed. And in 1616 the king sent his letters to the archbishop of Canterbury to excite all the clergy of his province to contribute to it: but the sum thus collected was but small; and the design of the college was defeated, and came to nothing. See Dr. FULLER's Church history of Britain, B. X. p. 51—55; Dr. WILLET's Synops. Papismi, p. 122, edit. 1613; HOWARD's Chronicle, p. 1067, edit. 1631; and COLLIER's Ecclesiastical History, vol. ii. p. 697.

¹⁰ Dr. GILBERT SHELTON.

¹¹ Dr. SEPH WARD.

At the meeting of the SOCIETY the same day,

Dr. CHARLETON cut the spleen out of a living dog with good success.

The experiment of shutting up a bird in condensed air was tried again with this success, that the air being compressed to half the space, and double the quantity of air being forced into the cavity of the engine, the bird seemed to be pretty well in it, having continued therein from twelve of the clock till four in the afternoon of that day.

It was ordered, that the trial be repeated, by compressing the air as far as safely could be done, to a treble and quadruple, with the bird in it.

Sir ROBERT MORAY mentioned a person, who had done very notable feats under-water in a bell, at 24, 25, and 26 fathoms depth, as taking ballast out of a ship, sawing asunder the decks of ships, in order to the taking out of guns, &c. but that at the depth of 24 fathoms, he used to fall into a swoon, and by the compression of the spirits bleed at his nose, ears, and eyes. Sir ROBERT MORAY was desired to procure the whole story of this matter, with all the particulars, in writing, which he promised to endeavour to do.

He observed, that this diver desired to be directed, how to convey a good number of barrels under water at a great depth, for the raising of sunk ships.

Mr. HOOKE produced the leaden boxes to be used under water, for furnishing of air by a couple of pipes, whilst the diver comes out of the bell or tub, and walks up and down working: which air being spent, the diver enters again into the tub or bell for a fresh supply.

It was ordered, that the experiment be made under water with those boxes; and that Mr. EVELYN inquire after the diver about Deptford for this purpose.

Dr. MERRET produced a fish called *lupus marinus* by SWINGFIELD, and caught in the Elbe, which hath double teeth round about its mouth, and even in the roof of it; serving to discover a vulgar error concerning toad-stones, which the doctor said to be nothing else but the teeth of this kind of fish, having shewn them to several goldsmiths (who acknowledged them to be the same with the supposed toad-stones) and made several chemical trials upon them, which confirmed these teeth and toad-stones to be the same thing. In the mean time, Mr. PALMER, Mr. HAAK, and others, who had toad-stones, were desired to produce them at the next meeting, to compare them with these teeth.

It was ordered, that Dr. MERRET and Dr. CHARLETON consider and make a catalogue of what is most desirable of all sorts of animals for the repository of the Society, both exotic and domestic; and withal, to give directions, how to prepare them as to their skins, when dead; concerning which, Dr. MERRET suggested, that the dust of pepper was good to dry out all their moisture after evisceration.

Others

Others proposed, that Mr. CREW's preserving powder, an account of which was formerly brought in by Dr. CHARLETON, might be sent into those parts, whence such animals are to be transported hither.

Mr. BOYLE suggested, that seeing animals of remote parts have particular and considerable inward contrivances, some liquor, as spirit of turpentine, might be thought upon, and sent abroad for the preservation of the internal parts, at least in smaller animals.

It was ordered, that Mr. POVEY, Mr. COLWALL, Dr. BALLE, and Mr. HILL be desired to take care of sending into foreign parts for such animals, as they should be directed, from time to time, by Dr. MERRET and Dr. CHARLETON.

Dr. MERRET moved, that in the first place notice should be taken, and a collection made, of all the rare productions of England, as to beasts, birds, fishes, vegetables, minerals, &c. concerning which he was desired to give all possible assistance himself, as having taken great pains in it already.

Dr. CHARLETON suggested, that Mr. MAY should be spoken to, that he might let the Society have all those fine exotic birds of the king, that should die.

Sir ROBERT MORAY mentioned, that his majesty had the curiosity of weighing himself very frequently, in order to observe the several emanations of his body before and after sleep, tennis, riding abroad, dinner and supper; and that he had found, that he weighed less after tennis by two pounds three ounces (but his majesty drinking two draughts of liquor after play, made up his weight) after dinner, more by four pounds and an half.

Sir ROBERT MORAY related, that he had heard from Dr. HINTON of a copulation of a male rabbit and a female cat, which produced monsters, whose fore-parts were like a cat, and the hinder parts like a rabbit; and that those monsters had reproduced more complicated monsters: of all which he hoped to procure a fuller account in writing.

Dr. CHARLETON related, that he had once taken out of a woman a very misshapen mass of a child, of twenty-three pounds weight, having no bones at all, nor head, nor heart, which, he said, he had then shewn to the president and to Dr. PRUJEAN. He was desired to bring in writing the whole story, attested by Dr. PRUJEAN, the president not well remembering the shape of the same.

Dr. WILKINS proposed, that Mr. FRANCIS WILLUGHBY, a fellow of the Society, and Mr. JOHN RAY, now both in Italy*, and intending for Spain, might

* Mr. RAY, in his *Observations made in a journey through part of the Low Countries, Germany, Italy, and France*, printed at London in 1673, in 8vo, observes, that Mr. WILLUGHBY and him-

self passed from Dover to Calais, April 18, 1663, and came to Venice in the beginning of October of that year.

be desired to pass from Cadiz to Teneriffe, and there make those experiments and observations formerly directed by some members of the society, and recorded in their books. This motion was well approved, and the proposer desired to write to Mr. WILLUGHBY and Mr. RAY to that purpose, and to send them a copy of those directions, as they are registered, together with the apparatus of instruments for such performances.

Sir ROBERT MORAY mentioning, that Dr. WALLIS had ready the catalogue of the places of the fixed stars assigned by ULUG BEIG, and desired by Monf. HEVELIUS, it was ordered, that it should be sent to the latter, together with a letter to be drawn up by the secretary, acknowledging his civility to the Society, and encouraging him to the prosecution of his celestial observations.

Sir ROBERT MORAY moving, that the whole book of ULUG BEIG, being astronomical, might be translated, and both the Persian original and the translation printed together, if Mr. ALLESTRY would undertake the printing; it was ordered, that he should be spoken with by Dr. WALLIS concerning it, and told, that the members of the Society would take every one a copy thereof.

Some persons having been, in the preceding meeting, appointed to observe the sun's entrance into Aries, Dr. WALLIS was desired to join with them therein.

Sir ROBERT MORAY produced the scheme of a comet seen at Gratz * the 2d of January, 1662, the first time, and at Rackelsburg and Czackathurn, Jan. 17, rising after midnight, and appearing till the break of day, of the same colour with other stars, but having the figure of an half-moon in the middle of its body, and the tail standing northward.

March 16. At a meeting of the COUNCIL were present,

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|------------------------------|----------------|
| The lord viscount Brouncker. | Dr. WILKINS. |
| Mr. HOWARD. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. HILL. |
| Sir PETER WYCHE. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Mr. BALLE. | |

It was ordered, that Dr. GODDARD and Mr. PALMER visit Mr. ELLISE, to desire him, from the COUNCIL, to peruse and consider the statutes of the Society.

The president, Sir PAUL NEILE, and Sir ROBERT MORAY were desired to be vigorous in prosecuting the business of Chelsea-college, and in putting a stop to his majesty's grant to Mr. SUTCLIFFE for pulling down the house; and to procure from Mr. COLE and Mr. SUTCLIFFE an information of the state of the whole matter concerning the foundation.

* In Sicily.

At

At the meeting of the Society on the same day,

Mr. GILBERT BURNET was proposed candidate by Sir ROBERT MORAY; and

Mr. JAMES CARKNESS by Dr. WILKINS.

Sir PAUL NEILE presented a copy of some of Mr. HORROX's astronomical papers; which Dr. WALLIS was desired to peruse, who accordingly took them with him to Oxford.

Dr. WILKINS and Dr. CROUNE desired to procure the originals of those papers from Dr. WORTHINGTON.

Dr. CROUNE took notice, that he had written to Dr. POWER to speak with Mr. TOWNLEY^b, concerning some writings of Mr. HORROX.

Sir ROBERT MORAY exhibited a letter of Monf. HUYGENS to him, dated at Paris, 20 Feb. 1664, N. S.^c containing an account of the experiment of the mercury's remaining suspended above the ordinary station; and of some gentlemen of Paris pretending to know the cause of that phenomenon.

Mr. HOOKE gave an account of the experiment of the last meeting, wherein the air having been compressed to half the room, the bird inclosed in the vessel for the space of about ten hours, was, at the end of that time, taken out very lively, and continued to till the next morning, but then began to sicken, and died towards evening.

It was ordered, that this experiment should be repeated at the next meeting to a greater degree of compression:

That several kinds of wood be broken at the next meeting: And

That the operator should provide against the same time some tadpoles, to be put into the rarefying-engine; as also to observe what Dr. CHARLETON suggested, of their being frogs, when the skin is stripped off.

Dr. CHARLETON mentioning, that toads have a long bony substance in their heads, dividing the brain, best to be shewn when there are ants to eat the skulls of toads clean, he was desired to shew this observation at the proper season.

He informed the Society, that the woman, out of whose belly the monstrous mass, mentioned by him at the preceding meeting, was taken, had promised to come herself and attest the fact at the next meeting.

^b CHRISTOPHER TOWNLEY, of Carr in Lancashire, esq; a zealous promoter of mathematical and astronomical studies, and the friend of Mr. WILLIAM MILBOURN, curate of Brancepeth in the bishopric of Durham, Mr. WILLIAM CRAFTS, a clothier, of Broughton near Man-

chester, and WILLIAM GASCOYNE, of Middleton in Yorkshire, esq; as well as of Mr. HORROX; all of whom were brought into the acquaintance of each other by means of Mr. TOWNLEY.

^c Letter-book, vol. i. p. 119, 120.

SIR ROBERT MORAY related, that he had been informed by the French ambassador, that there was at that time a diver at Dieppe able to stay one or two hours, and longer, under water, and to take out of sunk ships things of value; as he had saved out of a ship under-water a box with 40000 guilders in it; using a head-piece wide only about the mouth, and a suit of leather well stopped and tied about him. SIR ROBERT suspected, that this diver might use a piece of sponge dipt in oil, and hold it in his mouth. He was desired to inquire farther into this matter.

MR. HILL was desired to inform himself of the truth of the way used by the divers of Thoulon, Genoa, and Ormus; and to consult PURCHAS concerning them, and the art they use in staying under water.

SIR ROBERT MORAY being called upon, for a written account of diving and working under water, promised to have it ready against the next meeting: as likewise the other account of instruments to take ballast out of ships, and to widen the open places of the decks of ships under water.

He mentioned, that there was come to prince RUPERT a rare mechanician, who pretended to raise water to what height he pleased by suction; to make a pistol, shooting as fast as it could be presented, and yet to be stopped at pleasure; and wherein the motion of the fire and bullet within was made to charge the piece with powder and bullet, to prime it, and to bend the cock: to make a wind-gun no bigger than one's thumb, to shoot a needle through a piece of an oak three inches thick without a noise; and so a pin through the heart of a dog without killing him: and to make a gun, that shall shoot as far as any other gun, and charging it with common powder, the shooting shall make no flame, nor smoke, nor noise, and shoot as far as ordinary guns. SIR ROBERT MORAY was desired to observe the performances of this artist, and to report them to the Society.

The operator giving notice, that there was a man presenting his service to dive, it was ordered, that he should be spoken to for that purpose, as soon as the season would permit; which was done accordingly by Mr. HOOKE.

DR. BALLE produced a toad-stone, to compare with the teeth of the fish brought in by Dr. MERRET at the former meeting. MR. PALMER and Mr. HOOKE, and all who had any such stones, were desired to bring in theirs also, in order to be compared.

MR. BOYLE mentioned, that many of these stones being collected together, it might easily be tried, whether they were animal substances or not.

DR. WILKINS produced a letter of Mr. MARSHALL, concerning the preserving of birds by opening them, and laying lime-dust upon the flesh of them, so that it might dry up all the moisture; which being done, their feathers would keep their beauty and fastness. Fishes and flies might be preserved by drying them in the sun.

He

He shewed the hair of an elephant, which was delivered to Mr. Hooke to be examined in a microscope.

Dr. CROWE was desired to inform himself from Dr. PUGH, about the best season of the year to mount the Pico Teneriffe.

Sir WILLIAM PETTY mentioned a way of measuring the hight of the Pico ; which he promised to give an account of at another meeting.

March 23. At a meeting of the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. WHISTLER. |
| Sir PAUL NEILE. | Mr. HILL. |
| Mr. AERSKINE. | Mr. COLWALL. |
| Mr. BALLE. | Mr. OLDENBURG. |
| Mr. PALMER. | |

It was ordered, that Sir ROBERT MORAY and Sir PAUL NEILE be desired to consult with the lord ASHLEY, whether it may be fit to desire the king to give a rule to the two secretaries of state, that all the proposals, that shall be made concerning mechanical inventions, be referred to the COUNCIL of the Royal Society, to be examined by them, as to their novelty, reality, and usefulness.

Sir ROBERT MORAY was desired to procure a full information concernidg Chelsea-college ; which he promised to do.

It was judged better, that the king might give a grant of Chelsea-college first to another person, and that the Society should then purchase it from such a donee, than that they should get it for themselves directly.

Mr. Hooke was ordered to expedite his engine with one wheel, for easy and speedy carriage ; as also his circular hour-glass, with several cells therein ; and his picture on a wall in a light room.

It was ordered, that Mr. Hooke produce at every meeting of the Society one of his microscopical discourses, in order to their being printed by order of the Society. And that several committees be appointed for the consideration and improvement of several subjects of philosophy.

At the meeting of the Society the same day,

Mr. BURNET and Mr. CARKESS were elected and admitted.

Dr. GODDARD's account of an experiment of spirit of wine, in a vessel exhausted of air, was read, and ordered to be registered⁴, as follows :

⁴ Original Register, vol. iii. p. 18.

⁵ In.

“ In order to the making of this experiment, consideration was had, how to estimate the strength of spirit of wine; and the way resolved on was, by comparing the weight of it with that of water: and here the manner of weighing and the sort of water were to be thought on. The former was, by taking the same dimensions or measure of both as exact as could be, to the least sensible difference; which was done by a glass vial, containing something above two ounces of water, with a small mouth and even neck (so small that water would not run out of it inverted) which being filled, a drop, more or less, would make a sensible difference, by rendering the surface convex or concave. This vial filled one time with spirit of wine, and another time with water, was weighed in a balance, which charged with four ounces at each end, would shew manifestly with $\frac{1}{4}$ of a grain, and sensibly with less; but for better certainty, no less than $\frac{1}{2}$ of a grain was taken notice of in the account. As to the water, trial was made of two sorts by weight, pump-water and conduit-water, the former whereof weighed about one grain in an ounce heavier; which difference is sufficient to render it so much fouler-tasted and harsher than the other. The other therefore being in reason purer, by the lightness, as well as to sense, by sweetness and other qualities, being determined on for trial, was distilled in balneo, the heat whereof would not force up any grosser substance, that might be contained in it: whereupon, the distilled water was found to be exactly of the same weight with the water before distillation, not differing $\frac{1}{2}$ of a grain in 1122 grains, which was the weight of what the vial before mentioned did contain. This should infer this conduit-water to be of a purer sort (being as light as itself distilled) and to contain nothing earthy or saline in it.

“ For spirit of wine, there were taken two sorts, rectified several times: the lighter was in proportion to water as 1 $\frac{3}{4}$. 193. 8 gr. to 2 6 18, or as 944 gr. to 1121, which was the full quantity weighed of both: the heavier was to the water as 1 $\frac{3}{4}$. 13. 2 gr. to 2 6 18, or as 986 grains to 1122; or because these numbers are capable of bipartition, it may be expressed more conveniently, that the former spirit was to the water as 472, and the latter as 493 to 561. The former of these spirits was of that strength, that a spoonful in a small silver cup did burn all away, and the latter left about $\frac{1}{10}$ part of phlegm, and this was hotter than one could endure to drink.

“ Of each sort of these spirits was put into a small vial, capable of more than double the quantity, somewhat above an ounce; that is to say, 1 $\frac{3}{4}$. 20 $\frac{1}{2}$ gr. of the former, and 1 $\frac{3}{4}$. 12 $\frac{1}{2}$ gr. of the later; for to bring both to the same exact weight would have been difficult, and have occasioned so much pouring to and fro, as to have impaired the spirits: and withal, in a third vial was put 1 $\frac{3}{4}$. 1 $\frac{1}{2}$ gr. of water: All these three were put together under a glass body cemented to the engine, and the air exhausted: upon the working, the spirits soon began to boil, and bubbles to arise; the lighter first, and larger with bubbles; both at a greater rate than is usual in warm water, while in the mean time the water could not be discerned to boil at all, or any bubble to arise in it: some of the bubbles were so large, as to make cells in the vials and partitions transverse through the whole.

5

“ After

" After standing twenty-four hours (the engine in the mean time having been wrought several times) the vials were taken out. The lighter spirit of wine had loft in weight 13. 9½ gr. the other 13. 6½ gr. so that the diminution in the former was as 3½ out of 500; in the later 30½ out of 492½.

" The water, upon exact weighing, had gained 2½ gr. which might give cause to suspect there had been some mistake in the weight of it before; but one particular may solve the matter, for it had clearly gotten a scent and taste of the spirit of wine, as if some of the spirits diffused through the glass body had embodied themselves within the water.

" There were set, for the same space of time, of the two spirits and water afore-said, three parcels, of the same weight as before; that is to say, of the first spirit 13. 22½ gr. or 502½ gr. and of the other, as it happened, just the same quantity; of the water 13. 11 gr. or 491 gr. in the like vials with their mouths open, in the open air: the first spirit loft in weight only 1½ gr. the second 2 gr. and the water to be sure did not get, but loft, according to the exactest weighing, that could be made, ¼ of a grain."

Sir ROBERT MORAY's relation concerning diving and working under water, received by him from Mr. MAULE, was read; together with an account of an instrument, with which the said Mr. MAULE could take ballast out of a ship lying 15, 20, or 25 fathoms under water: both which papers were ordered to be registered*, as follows:

" A bell of lead of about 2½ foot deep, and as wide at bottom, was used for serving of air under-water.

" There was a rope fastened a-cross the bell, upon which the person sat, that dived in it.

" He himself hath been under water 15 or 16 fathom, and stayed there half an hour.

" Others have been 20 or 24 fathom, and above, and stayed as long.

" Some are much abler to stay under water than others; for some have bled at nose and ears under that depth, others not; and they, who do so at first, will be the more able to endure it at the second or third trial.

" When there was any work to be done, that was of long duration, he had two or three men, who relieved one another.

" They were not naked when they dived, but having first anointed their bodies with train-oil, they put on trowsers, and a close waistcoat of flannel, which were

* Original Register, vol. iii. p. 20.

" dried

"dried at a fire in the boat, by which the bell was hung in the water, to be ready
"for the next turn.

"His men never went out of the bell.

"When the bell is let down into the depth of 16 fathoms, and the divers have
"continued there some half an hour or more, very ordinarily they swoon or fall
"in a sleep, they know not how; so that upon notice thereof, they being drawn
"up, do not recover, but by holding them by the nostrils; and then wonder how
"they came to be so drowly.

"The decks of ships, planks, and stones under water, are so slippery, that it
"is hard to walk on them without falling; especially when they lie a-slope, as all
"decks of ships do under water.

"The bells are to have skores drawn in them from top to brim, that the dew
"proceeding from the breath may the more easily distil in them.

"If the diver do fan his face in the bell, when it is sunk deep, with a fan or
"wooden trencher, it will much refresh him.

"The air in the bell grows very hot and stifling, after having breathed in it
"half an hour or so, when it is 10 fathom deep or more.

"When the air in the bell is warm, so much of the body as is within it is warm,
"and the rest cold; but the train-oil preserves the cold in some measure.

"Mr. MAULE hath an instrument, with which he can take ballast out of ships
"lying under water at 15, 20, or 25 fathom deep.

"This engine is so framed, that when it is let down to the depth required, it
"hath an arm, that by a pulley is stretched out to a great length; and having an
"iron hoop, with a bag or net fastened to it, doth drag out the ballast, and throw
"it into the sea.

"He hath also another engine, to widen the open places of the deck of a ship
"under water, if need be, for making room for a gun or other thing to be taken
"out of the ship's hold, at great depths under water. It is a saw, which letteth
"down through long bored pieces of timber by the pumps, making them move
"up and down by ropes and pulleys; and hath a rope tied to the saw, the end
"whereof is held by a man or two in a boat at 150 or 200 fathom distance to
"pull the saw, so as to make it bear upon the timber, as is fit.

"He hath often attempted to sink empty barrels 18 or 20 fathom under water,
"having a device like the engine for taking up ballast, to thrust and place them
"under the decks of the ship, thinking thereby to buoy up sunk ships; but never
"could get the barrels to go down whole, for the pressure of the water constantly
"crushed

“ crushed them to pieces, before they could be sunk to the depth required; and
“ having strengthened the barrels with iron bars and hoops within, so that it was
“ much harder to break them inwards than outwards; yet in despite of all he
“ could do, they were always crushed as before.

“ He affirms, that an expert diver can stay under water a long while, without
“ any other help for respiration than a piece of sponge dipt in oil, which he holds
“ in his mouth, having his nostrils stopt; believing, that by means of the oiled
“ sponge he can suck air enough out of the water to serve him for divers respira-
“ tions.”

Mr. COLWALL's account of frauds committed about hides and leathers, expressed in the statutes, was read, and ordered to be communicated to Mr. CHARLES HOWARD, in reference to his history of tanning.

Mr. BOYLE produced a substance found in ambergrise, said by some to be the beaks of birds. He was desired to examine it chemically, to see whether it be an animal substance or not.

The business of diving being again spoken of, Dr. CHARLETON made mention of one Mr. KNIFE, as able to give a good account of the diving for the Coco-Maldiva. He was desired to procure that account in writing; which he promised to do when Mr. KNIFE should come to town.

Mr. BOYLE gave the Society some account of Monf. PASCAL's lately published treatise of the weight of the air, and promised to give a larger account hereafter.

He likewise shewed some experiments mentioned in that book, and was desired to give them in writing; and to add, at his first convenience, the experiment concerning the manner of the ascension of water in pumps: in order to which, the operator was ordered to draw three or four of the glass-pipes, employed by Mr. BOYLE, for the shewing of this experiment.

The operator gave an account of the experiment of the condition of the bird in the air compressed to a third; viz. that it was somewhat sick whilst inclosed in the vessel, wherein the said compression was made; but being taken out, was found well and lively, though afterwards sick again; yet died not, as the other did in a former experiment, but recovered perfectly.

The experiment of breaking several sorts of wood was begun to be made; and there were taken three pieces of several kinds of fir, oak, and ash; each an inch thick, and two foot long: the fir, weighing $8\frac{1}{2}$ ounces, was broken with two hundred weight; the oak, weighing $12\frac{1}{2}$ ounces, broken with two hundred and a half weight; and the ash, weighing $10\frac{1}{2}$ ounces, was broken with three hundred twenty-five pounds weight.

Besides, there were taken three pieces of the same sorts of wood, each half an inch thick, and a foot long. The fir weighed one ounce, and was broken with $\frac{1}{4}$ of an hundred. The oak weighed $1\frac{1}{4}$ ounce, and was broken with $\frac{1}{4}$ of an hundred : and the ash weighed $1\frac{1}{2}$ ounce, and was broken with an hundred pounds.

Again, there was a piece of fir half an inch square, and two feet long, broken with thirty-three pounds. A piece of half an inch thick, an inch broad, and two feet long, broken with an hundred weight edgewise : and a piece of half an inch thick, an inch and an half broad, and two feet long, broken with an hundred and twenty-five pounds weight edgewise.

This experiment was ordered to be prosecuted by the lord viscount Brouncker, Sir WILLIAM PETTY, and Mr. Hooke ; and it was suggested by some of the members, that in these trials consideration might be had of the age, knottiness, solidity, different soils, and several parts of trees ; and an account brought in writing of the whole.

Sir ROBERT MORAY particularly moved, that it might be observed, how far any kind of wood bends before it breaks.

Mention being made of the standard how to estimate highly rectified spirit of wine by, Sir WILLIAM PETTY suggested, that it might be estimated by its burning away quicker by wicks, the ordinary standard being its burning away by flame.

Mr. OLDENBURG, the secretary, gave some account from Mr. BEAL concerning the spirit of cider, viz. that one Mr. GULSON, a candid and able artist in Somersetshire, had distilled some cider made of promiscuous cider-fruit, and obtained one full pint of very good spirit out of four quarts of such cider ; but had not expressed, whether he had employed old or new cider.

Sir PAUL NEILE related, that he had been informed, that Sir EDMUND SAWYER had obtained double the quantity of spirit from cider made of the Bramsbury and Fillet to that of pippins.

Mr. BOYLE related from a credible person in Russia, that in those parts there had lately appeared a comet, and that there had been felt a considerable earthquake, a thing unusual in that country.

Dr. CROUNE promised to write to Dr. POWER about Mr. GASCOYNE's papers concerning glass.

Mr. BEAL having offered by letter to communicate several observations on agriculture, if the society should please to appoint a committee to receive and examine them ; it was thought good, that the council should consider of this and other committees for several subjects ; and having appointed them, and nominated

minated fit persons for them, present them to the society for their approbation or alteration.

Sir ROBERT MORAY mentioned, that Monsieur Le SON, then in England, pretended so to compress the air, as to make it burn wood.

1664. *March 30.* At the meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Mr. HOWARD. | Dr. MERRET. |
| Sir ROBERT MORAY. | Mr. BALLE. |
| Sir PAUL NEILE. | Mr. PALMER. |
| Sir ANTHONY MORGAN. | Mr. COLWALL. |
| Sir PETER WYCHE. | Mr. OLDENBURG. |

A draught of eight committees for the consideration of several subjects belonging to the cognizance of the society was read, and ordered to be offered to the society at their meeting this afternoon for their approbation.

The following order of council was made,

“ When any three or more of the council (the president and one of the secretaries being two of the number) are met at the time and place appointed for any meeting thereof, they are desired to examine, consider, debate, and prepare any business or matter appointed to be considered or done by the council, and report what is by them agreed upon to the same, and to give directions for making and preparing experiments.”

It being proposed to Mr. MARTYN, the society's printer, whether he would be at the charge of the translation and printing of the astronomical manuscript of ULUG BEIG, he was desired to send his answer within two or three days to Dr. WILKINS, to be by him signified to the president.

Sir ROBERT MORAY and Sir PAUL NEILE were desired to get from the attorney general the paper declaring, that it is in his majesty's power to dispose of Chelsea-College, and to refer the same, together with the charter of the said college, to the consideration of Sir ANTHONY MORGAN.

Dr. MERRET proposing a person fit to be entertained by the society as an assistant to the operator, and as a collector of the curiosities of England, as to plants, birds, and fish, he was desired to address him to Dr. WILKINS and Dr. GODDARD for farther examination of his fitness for such services.

It was ordered, that the society's tube be lent to Mr. MOXON to make observations with.

F f f 2

At

At the meeting of the SOCIETY on the same day,

Monsieur JOHN HEVELIUS, consul of the city of Dantzic, was proposed for candidate by Sir ROBERT MORAY; and, because a stranger of eminent worth, chosen the same day.

The secretary was ordered to give him notice hereof in the letter appointed March 9 preceding to be written to him.

Dr. CHARLETON acquainted the society, that one Mr. KLEE, an apothecary, was attending without, able to testify what he had formerly related concerning the monster taken out of a woman, like a great fat goose, with two human feet, very mis-shapen. He was again desired to bring in writing the relation of all the particulars thereof, attested by himself, Mr. KLEE, and others, who had seen it. Mr. HOOKE was ordered to draw the picture of it, according to Dr. CHARLETON's directions.

Mr. HOOKE gave an account of the experiment of compressing the air to a quarter, with a little bird in the engine; which having continued therein from eleven in the morning till ten at night somewhat panting, was then taken out, and grew lively enough, yet sickned next day, but was soon well again, and remained alive at this day.

It was ordered, that because in the former experiment of this kind, the bird died, and the cause thereof was by some suspected to be the smell of the cement, trial should be made, whether it were so or not, by putting one bird into a glass with common air, closed with clay, and another into the compressing engine, with common air likewise, but closed with cement, to see, which of these two birds would do best, and live longest.

Mr. BOYLE presented his *Experiments and considerations touching colours* ¹.

Sir CHARLES BERKLEY ² was permitted to be present at this meeting upon the motion of Dr. WILKINS.

The president produced two letters of Dr. WALLIS concerning the translation and printing of the astronomical institutions of ULUG BEIG; and acquainted the society, that in case their printer would be at the charge of the translation thereof, it would be proper to have it printed; and that the printer had notice given him of it by the council, who expected an answer within a short time.

Sir ROBERT MORAY produced a letter sent him out of Scotland by the lord REAY, concerning a shining rock in an island of Scotland, discernible in the night-

¹ Printed at London 1663, in 8vo. and reprinted there in 1670.

² Eldest son of GEORGE lord BERKLEY, created

knight of the Bath at the coronation of king CHARLES II.

time,

time, which was seen in his father's days, but said by the inhabitants of that place not to have been seen for above twenty years past; but only, that sometimes after a storm (a sudden calm ensuing) they discerned a brightness under the water. Sir ROBERT MORAY was desired to press a farther inquiry into this fact.

The operator gave an account of more pieces of wood broken by weight, *viz.*

1. Of a piece of fir, four feet long, two inches square, fifty-three ounces weight, broken with 800 lb. weight, and very little bending with 750 lb. Whereby the hypothesis seems to be confirmed, that in similar pieces, the proportion of the breaking weight is according to the basis of the wood broken. 2. Of a piece of fir two feet long, one inch square, cut away from the middle both ways to half an inch, which indured 250 lb. weight before it broke, which is more by 50 lb. than a piece of the same thickness every way was formerly broken with. This difference was guessed to be in the greater firmness of this than that of the other piece.

The president was desired to contribute to the prosecution of this experiment, and particularly to consider what line a beam must be cut in, and how thick it must be at the end, to be equally strong.

Mr. BOYLE was put in mind of the experiment, which he promised at the preceding meeting, to shew the ascent of water by syphons; and the operator was ordered to have ready the glasses appointed for it against the next meeting.

Sir ROBERT MORAY took occasion to speak of the proportion of the lateral to the perpendicular pressure of water, desiring, that Mr. BOYLE might consider that subject.

The president was desired to consider the *aquæ salientes*.

The experiment of compressing water in a copper ball was tried, but succeeded not, the vessel leaking upon the making a dent in it. It was ordered to be repeated at the next meeting, and the vessel to be made fitter for trial.

Mr. HOOKE was ordered to make at the next meeting the experiment to prove, that glass will stretch.

An experiment was made in a bolt-head with a long small stem filled with cold water, and then put into warm water; whereupon it sunk to half an inch, whereas otherwise it rises by warmth. The cause of this sinking was by some ascribed to the stretching of the glass by warmth. It was ordered to be repeated at the next meeting.

• A list

A list of the several committees of the society.

1. Mechanical.

To consider and improve all mechanical inventions.

| | | |
|--------------------------|------------------------|----------------------|
| Mr. AERSKINE. | Mr. EVELYN. | Sir WILLIAM PERSALL. |
| The lord ANNESLEY. | Lord bishop of EXETER. | Sir WILLIAM PETTY. |
| Earl of ARGYLE. | Sir FRANCIS FANE. | Sir PETER PETT. |
| Lord ASHLEY. | Sir JOHN FINCH. | Mr. POVEY. |
| The lord vis. BROUNCKER, | Dr. GODDARD. | Commissioner PETT. |
| president. | Lord HATTON. | Dr. PELL. |
| The duke of BUCKINGHAM. | Sir ROBERT HARLEY. | Dr. POPE. |
| The lord BERKELEY. | Sir EDWARD HARLEY. | Earl of SANDWICH. |
| Mr. ROBERT BOYLE. | Mr. HOOKE. | Sir JAMES SHAEN. |
| Mr. RICHARD BOYLE. | Mr. JONES. | Mr. SOUTHWELL. |
| Mr. BRERETON. | Sir ANDREW KING. | Earl of TWEEDALE. |
| The abbé DE BEAUFORT. | Lord LUCAS. | Sir GILBERT TALBOT. |
| Sir EDWARD BYSSHE. | Sir ELLIS LEIGHTON. | Sir JOHN TALBOT. |
| Sir JOHN BIRKENHEAD. | Sir JOHN LOWTHER. | Col. TUKE. |
| Dr. RALPH BATHURST. | Col. LONG. | Mr. MATTHEW WREN. |
| Mr. ISAAC BARROW. | Lord MASSAREENE. | Mr. WINTHROP. |
| Earl of CRAWFORD and | Sir ROBERT MORAY. | Dr. WILKINS. |
| LINDESEY. | Sir ANTHONY MORGAN. | Dr. WALLIS. |
| Lord CAVENDISH. | Earl of NORTHAMPTON. | Dr. WREN. |
| Marquis of DORCHESTER. | Sir PAUL NEILE. | Mr. WILLIAMS. |
| Earl of DEVONSHIRE. | Sir THOMAS NOTTE. | Sir PETER WYCHE. |
| Lord DUNGARVAN. | Earl of PETERBOROUGH. | Sir CYRILL WYCHE. |
| Sir JOHN DENHAM. | Sir ROBERT PASTON. | Monf. DE ZUYLICHER. |
| Earl of ELGIN. | Sir RICHARD POWLE. | |

2. Astronomical and Optical.

| | | |
|-------------------------|--------------------|-----------------------|
| Lord BROUNCKER, presid. | Monsieur HEVELIUS. | Mr. PALMER. |
| Mr. BOYLE. | Mr. HOOKE. | Dr. PELL. |
| Mr. BALLE. | Sir ROBERT MORAY. | Dr. WALLIS. |
| Mr. BARROW. | Sir PAUL NEILE. | Dr. CHRISTOPHER WREN. |
| Lord bishop of EXETER, | Mr. NEILE. | Monsieur ZUYLICHER. |

3. Anatomical.

| | |
|------------|------------------------------------|
| Mr. BOYLE. | Dr. WILKINS. |
| Mr. HOOKE. | All the physicians of the society. |

4. Chemical.

| | |
|---------------------|------------------------------------|
| Duke of BUCKINGHAM. | Mr. HENSHAW. |
| Mr. BOYLE. | Monsieur LE FERURE. |
| Sir KENELM DIGBY. | Sir ROBERT PASTON. |
| Mr. CHARLES HOWARD. | All the physicians of the society. |

5. Geo-

5. Geographical.

| | | |
|-----------------------------------|--------------------|-------------------|
| Lord ASHLEY. | Mr. EVELYN. | Sir ROBERT MORAY. |
| Mr. AUSTIN. | Mr. FORD. | Mr. OLDENBURG. |
| Mr. AUBREY. | Dr. GODDARD. | Mr. PACKER. |
| Mr. BOYLE. | Sir EDWARD HARLEY. | Mr. POVEY. |
| Mr. BRERETON. | Mr. HENSHAW. | Dr. SMITH. |
| Mr. BALLE. | Mr. HOWARD. | Mr. EDWARD SMITH. |
| Mr. BEAL. | Dr. HOLDER. | Sir JOHN TALBOT. |
| Earl of CRAWFORD and LINDESEY. | Mr. HILL. | Mr. WALLER. |
| Dr. COTTON. | Mr. HOSKINS. | Mr. WATERHOUSE. |
| Mr. COLWALL. | Mr. LONG. | Dr. WILKINS. |
| | Dr. MERRET. | Mr. MATTHEW WREN. |

6. For Histories of Trade.

| | | |
|-------------------|--------------------|----------------|
| Mr. BEAL. | Mr. HILL. | Mr. SLINGSBY. |
| Mr. ROBERT BOYLE. | Mr. HOSKINS. | Mr. SOUTHWELL. |
| Mr. COLWALL. | Mr. HOOKE. | Mr. STANHOPE. |
| Dr. COTTON. | Mr. HOWARD. | Mr. STANLEY. |
| Mr. CREED. | Mr. LOWTHER. | Mr. VERMUYDEN. |
| Dr. CROUNE. | Dr. MERRET. | Dr. WILKINS. |
| Mr. ELLISE. | Sir ROBERT MORAY. | Mr. WILLIAMS. |
| Mr. EVELYN. | Sir WILLIAM PETTY. | Mr. WILLUGHBY. |
| Mr. GOMELDON. | Mr. POTTER. | Mr. WINDE. |
| Mr. GRAUNT. | Mr. HENRY POWLE. | Mr. WINTHROP. |
| Mr. HAYES. | Mr. PROBY. | Mr. WYLDE. |
| Mr. HENSHAW. | Mr. SCHROTER. | |

7. For collecting all the phenomena of nature hitherto observed, and all experiments made and recorded.

| | | |
|---------------|----------------|-----------------------|
| Mr. ASHMOLE. | Dr. CHARLETON. | Mr. HOSKINS. |
| Mr. BALLE. | Mr. CLAYTON. | Dr. MERRET. |
| Mr. BARROW. | Mr. COXE. | Mr. NEILE. |
| Dr. BATHURST. | Mr. DRYDEN. | Dr. PELL. |
| Mr. BEAL. | Dr. GLISSON. | Mr. SPRAT. |
| Mr. BURNET. | Mr. HENSHAW. | Dr. WALLIS. |
| Mr. CARKESS. | Mr. HOOKE. | Dr. CHRISTOPHER WREN. |

8. For Correspondence.

| | | |
|---------------|--------------------|-------------------|
| Mr. AERSKINE. | Sir KENELME DIGBY. | Col. TUKE. |
| Dr. BALLE. | Mr. HAAK. | Dr. WILKINS. |
| Mr. BEAL. | Mr. HILL. | Mr. WILLIAMSON. |
| Mr. BOYLE. | Sir ROBERT MORAY. | Mr. MATTHEW WREN. |
| Mr. CLAYTON. | Mr. OLDENBURG. | Sir PETER WYCHE. |
| Mr. COLWALL. | Mr. POVEY. | Sir CYRIL WYCHE. |
| Mr. CREED. | Monsieur SORBIERE. | |

April 6. At a meeting of the COUNCIL were present

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. PALMER. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. WHISTLER. |
| Sir ANTHONY MORGAN. | Mr. HILL. |
| Mr. AERSKINE. | Mr. COLWALL. |
| Sir PETER WYCHE. | Mr. OLDENBURG. |
| Mr. BALLE. | |

It was ordered, that Mr. PALMER be added to the Monday's committee for preparing experiments to entertain his majesty.

It was likewise ordered, that the secretary draw up a form of a diploma testifying strangers to have elected into the society.

The following draught of a statute dispensing with foreigners elected into the society, as to their subscription and admission, was read, and passed the first time :

" When any person residing in remote or foreign parts shall be elected into the society in the due and accustomed form and manner, the said person shall be registered among the fellows of the society, and be reputed a fellow thereof, without subscription and admission in the usual form, any thing contained in the statutes, requiring subscription and admission, to the contrary notwithstanding. And the said person may have an instrument under the seal of the society, testifying him to be elected and reputed a fellow of the society accordingly."

The President, Sir ROBERT MORAY, and Dr. WILKINS, were desired to visit the ground belonging to Chelsea College, and to observe how it lies.

It was ordered, that Dr. WILKINS desire the bishop of Exeter to inquire, what the dean of St. Paul's^b pretended with respect to that college : And

That the secretary desire Mr. BOYLE to inform himself by the lord privy seal, why the king's grant of that college to Mr. SUTCLIFFE was stopped ? and what his lordship judged of the causes alledged by the petitioners for stopping the said grant ? as also occasionally, and by way of discourse, what his lordship thought of his majesty's power of giving away that college, and dissolving that corporation ?

At the meeting of the SOCIETY on the same day,

An account was given by Mr. HOOKE of the two birds, that were put, one into a glass with common air, closed with clay ; the other into the compressing engine with common air likewise, but closed with cement, viz. that the bird in the glass, after it had been kept there eight hours, remained alive and pretty well ; but the other bird closed up with cement, died within the same time. It was desired,

^b Dr. JOHN BARNWICK.

that

that a way might be thought of to remedy that smell, which seemed to be the cause of the bird's dying in the condensing engine.

The experiment of compressing water in a copper-ball was repeated, but succeeded not, the vessel leaking again as formerly upon knocking. It was ordered, that the operator should provide against the next meeting a leaden ball, holding about two quarts, and consisting of two hemispheres cast thick and well polished.

The experiment of stretching glass was made by Mr. HOOKE, who was desired to give an account of the manner and success thereof in writing.

The experiment of making cold common water, put into a bolt-head with a long and small stem, subside with warm water, and rise with cold, was repeated; and Mr. HOOKE desired to bring in an account of it in writing.

A letter of Col. LONG to Sir ROBERT MORAY was read, acknowledging his philosophical debts to the society, and giving an account of elms becoming great trees from chips having some bark upon them; as also from boughs chopt on each side, and put into a nursery of good ground, laying them along in trenches, and covering them with good mould, &c. This with the rest was ordered to be communicated to Mr. EVELYN, and Sir ROBERT MORAY was desired to give Col. LONG the thanks of the society for these communications, which came accompanied with some rare stones with screws in them; as also with a stone taken out of an ox's gall, but broken, affirmed in the presenter's letter to have been as big as a Seville-orange of a middle size; weighing an ounce and half, and smelling like musk.

Sir ROBERT MORAY related from one Mr. ROBINSON, that at Leghorn there were fold upon the market-place pieces of a certain rock, which being broken, were found to contain live and eatable muscles in them. Dr. BALLE was desired to write to his brother, then in Leghorn, for farther information concerning this story.

Sir ROBERT MORAY mentioned from the same Mr. ROBINSON a substance of rock-salt, having a bubble in it, which, what way soever the body be turned, will be on the top. He was desired to procure a sight of this piece for the society from Mr. ROBINSON.

Dr. CHARLETON remarked, that there were some knowing persons, who would maintain, that images are erected in the retina; and that, notwithstanding the diversity of mediums in the eye, there was made but one single refraction. It being urged by him, that those persons offered to prove their assertions by experiments, he undertook to engage them to do so.

The experiments of breaking wood were ordered to be prosecuted the next day, and the operator was directed to provide some crooked oaken billet, and to cut two strain pieces out of the middle thereof, wherein the grain will run arching, in order to consider the grain of the wood.

VOL. I.

G g g

April

April 13. At a meeting of the COUNCIL were present

The lord viscount Brouncker,
president.

Mr. Howard.

Sir Robert Moray.

Sir Anthony Morgan.

Mr. Aerskine.

Sir Peter Wyche.

Mr. Balle.

Dr. Goddard.

Dr. Whistler.

Mr. Palmer.

Mr. Hill.

Mr. Oldenburg.

It was debated, whether the manuscript of ULUG BEIG should be printed by another, if MARTYN and ALLESTRY, the society's printers, would not do it? But it was not fully resolved upon by reason of the non-attendance of those two persons, who had been appointed to be present this day. It was ordered, that they should have notice to attend the council at the next meeting.

The statute dispensing with foreigners elected into the society for their subscription and admission was read again, and passed the second time with some small alteration, as follows:

"When any person residing in foreign parts shall be elected into the society in due and accustomed form and manner, the said person shall be registered among the fellows of the society, and be reputed a fellow thereof, without subscription or admission in the usual form; any thing contained in the statutes, requiring subscription and admission, to the contrary notwithstanding. And the said person may have an instrument under the seal of the society, testifying him to be elected and reputed a fellow of the society accordingly."

The secretary offered a draught of such a diploma, as is mentioned in the above-mentioned statute, with relation to Monsieur HEVELIUS; and it was read, and approved with some alterations, as follows:

Præses, concilium, & sodales Regales Societatis Londini pro scientiâ naturali promovendâ, omnibus & singulis, ad quos præsentés pervenerint, salutem. Cum virtute & scientiâ mathematicis, præcipuè verò laboribus & scriptis astronomicis illustris dominus JOHANNES HEVELIUS, celeberrimæ civitatis Gedanensis consul amplissimus, singularem juum in diâle Societatis conatus & studia affectum humanissimis literis uberrimè fuerit testatus, suisque meritis egregiis rem literarium & solidam imprimis philosophiam augere & ornare pro virili satagat; diâla Societas laudatum dominum Hevelium die 30 Martii anni 1664, in solenni confessu, conspirantibus omnium suffragiis, in sodalium suorum album excepavit, inque hujus rei testimonium sigillum suum præsentibus affigi curavit. Dat Londini anno æræ Christianæ 1664, regni CAROLI II. augustissimi Nèquæ Britanniæ, &c. regis, diâle Societatis fundatoris & patroni munificentissimi, decimo sexto.

At the meeting of the SOCIETY on the same day,

The experiment of compressing water in a leaden ball was tried by weighing the leaden ball, filled with water, in water, and then taking it out, and knocking dens into,

into, and so weighing it again in water, to see, whether it weighed any thing more than it did before it was knockt. But the difference of the weight was so imperceptible, that the scale seem'd not so much as to turn, although the dents were considerable; but there appear'd some compression in the water by its spitting out, when the ball was bored through.

Mr. Hooke mentioned, that he had another way of compressing water, which he was order'd to prepare for the next meeting.

Mr. BOYLE likewise took notice of an experiment of compressing water to be made some weeks after.

Mr. Hooke affirm'd, that water in a trial of his would not compress sensibly with that force, which would compress the air into the 11th or 12th part.

An account in writing was brought in by Mr. Hooke of two experiments tried before the society at the preceding meeting. 1. Of the raising of water in a bolt-head upon immersion in cold, and falling upon the immersion of it in hot water. 2. Of the stretching and shrinking of glafs upon heating and cooling: both which were order'd to be register'd, as follow:

" There was taken a large bolt head, containing about two quarts, which was filled with water till it rose about a foot in the stem (which was small) then the station of the water being marked, it was immerst in warm water, whereupon the water in the slender stem fell about half an inch; but upon continuing in that warm liquor, it by degrees re-ascended, and surmounted its former height.

" Afterwards, while yet pretty warm, it was immerst in cold water; whereupon the water rose about a quarter of an inch, but upon a longer stay in that medium, it fell again to that place from which it had ascended, and afterwards below it.

" The reasons of which phenomena seem deducible from the stretching and shrinking of the glafs upon the sudden access of heat and cold, before these qualities can alike affect the included water.

" To prove the stretching and shrinking of glafs upon heating and cooling, there were made these trials.

" There was taken a hollow cylinder of glafs, about a span long, sharpen'd and sealed up at both ends. This was fitted between the centers of a turning-lathe, so that it would be very easily moved and turned round whilst cold, but upon the heating the middle of this glafs with the flame of a candle, it stretch'd so far in length, that it could not without much difficulty be turned round: but afterwards upon cooling, it shortned and returned to its former laxity, being as easy to be moved as before.

¹ Original Register, vol. iii p. 23.

“ Because it was objected, that possibly the rarefaction of the included air might
 “ be the cause of this stretching, the same experiment with the same success was
 “ tried with the same cylinder opened at one end, so that the air had a free passage
 “ to and fro.”

SIR ROBERT MORAY, MR. SLINGESBY, DR. GODDARD, and MR. HOOKE were appointed curators for the weighing of all sorts of bodies.

DR. WALLIS's two letters, written to MR. OLDENBURG from Oxford, April 6 and 7, 1664, were read; wherein the doctor gives an account of the businesses committed to his care by the society about the catalogue of the fixed stars written by ULUG BEIG, and the translating and printing of the whole manuscript of the said ULUG BEIG; as also of his and DR. WREN's judgment concerning three manuscripts of MR. HORROX for the restitution of astronomy.

The doctor in his letter of the 6th of April^a observes, that upon his return to Oxford he spoke with MR. THO. HYDE, as he had been desired by the society, concerning the translating and printing ULUG BEIG in Latin, to know, whether MR. HYDE was willing, and upon what terms, to undertake it. MR. HYDE answered, that as to the part concerning the fixt stars, which he had already translated, he was willing to take the care of the impression *gratis*, if the society's printer would undertake the charge thereof, provided it was printed at Oxford; because otherwise he could not attend the press by reason of his attendance on the Bodleian library. For the rest of the work, if the society desired it, he would be willing to serve them in translating and taking care of the impression in like manner, and would refer himself to them to gratify him for his pains as they should think fit: but being pressed farther to make a particular proposal (according to the society's instructions to DR. WALLIS) he thought that he might deserve twenty or thirty pounds, and some copies for presents to his friends: but if the society should think that too much, he would be ready to serve them, and refer himself absolutely to their pleasure. He added, that he was willing, if he should undertake it, to go in hand with it as soon as might be, because he knew not how soon he might be otherwise diverted; and if it should be agreed upon, he would put to the press the part already done, that it might be printed, while the rest was translating. DR. WALLIS declared it to be his opinion, that MR. HYDE well deserved the reward, if the society's stock could spare the money, considering, that he must not only translate, but likewise transcribe the whole Persian copy for the press, and then (which was not the least part of the task) attend and correct the press all the while; which in a book of that bulk (for it would make a large quarto) and in such a language, he would find a troublesome work; though it was probable, that he rather looked upon the credit of it than the sum proposed as the reward. In the mean time DR. WALLIS had transcribed that part of it which contained the catalogue of the fixed stars out of MR. HYDE's translation, which the doctor had before compared, as to numbers, with the three Persian books very accurately. And he did this the rather himself, that he might be the better satisfied of the exact agreement

^a Letter-book, vol. i. p. 126.

of the numbers with the original, which was of great importance in a work of that nature, and very subject to mistake by a common transcriber. This transcript, with a letter to HEVELIUS in answer to one from the latter to him, was inclosed in the doctor's letter to Mr. OLDENBURG, in order that it might be immediately transmitted to HEVELIUS, who would, the doctor presumed, be willing to see it sooner than the impression could be expected. As to the pieces of Mr. HORROX, which Dr. WALLIS had been desired to peruse for the satisfaction of the society, whether they were proper to be printed, he had accordingly read them himself, and likewise desired his colleague Dr. CHRISTOPHER WREN to do the same; and their joint opinion was, that as to the English piece, it would not be fit for publication, because it contained only broken incoherent things, set down by the author only for his memory, as they came into his mind, and brought for the most part into the Latin in their proper places, and sometimes with retractions and alterations upon second thoughts of what he had at first set down in the English. But they looked upon the Latin pieces as the beginning and attempt of an excellent work for the restitution of astronomy, and which served to shew, how great a loss it was, that Mr. HORROX died so soon, since it appeared from this and that concerning his observation of Venus seen in the sun, already printed¹, both of them composed by him when he was young, with how much diligence and sagacity he was likely to have applied himself to those studies, if he had lived. And though these pieces were very imperfect, and not near finished, yet they contained the hints of very good things, which deserved to be preserved. It might indeed seem needless to confute LANSBERG², and perhaps unseasonable, when the world was already satisfied, that his tables did not answer the commendations, which himself gave them. But though this seemed to be the direct intention of the title, yet it was the least part of what was intended in Mr. HORROX's work; which undertakes so to shew LANSBERG's errors, as at the same time to substitute the true hypothesis and true measures from observation, instead of them. And upon that account, especially if Mr. HORROX's observations were likewise preserved, which these pieces testified to have been made by him in great number and with great care, as well as his tables, which Dr. WREN told Dr. WALLIS he had seen in Mr. JONAS MOORE's hands, they might, together with these Latin pieces, be printed to very good purposes. But it would then be necessary, that these two Latin pieces be both digested so, as to be brought into one (for they were only two attempts of the same thing) which might easily be done by beginning with the prolegomena of the lesser piece, and then proceeding with the other in order to the beginning of the fifth disputation; which fifth disputation (which was the same in substance with what followed in the less piece of the prolegomena) might admit of some insertions out of the less piece so far as it goes. A preface must be prefixed by the publisher, to give an account why the work comes out so late, and why so imperfect; and the whole must be compared with the papers, from which it was transcribed; for it was manifest from the gross mistakes, of which Dr. WALLIS corrected some hundreds as he read it, that it was transcribed by one, who did not well understand either astronomy or Latin. The doctor with this account returned to Mr. OLDENBURG the books themselves, to be restored to the society, from whom he had them.

¹ By HEVELIUS with his own *Mercurius in sole visus*. ² PHILIP LANSBERG, of Ghent, whose tables of the celestial motions was printed at Middleburg in 1632.

Upon

Upon reading this letter, it was ordered, that the secretary should return Dr. WALLIS the thanks of the society for his special care and great pains taken in these particulars; and desire him in their name, to gratify the learned world with digesting the Latin pieces of Mr. HORROX in such a manner, as he had advised himself in his letter of April 6.

The business of translating and printing ULUG BEIG was referred to the consideration of the council, to fix upon a translator, and to regulate the charges of the whole.

There was also read a Latin letter of Dr. WALLIS to Mr. HEVELIUS, dated March 30, 1664, wherein he gives the latter notice, 1. Of his sending him the written catalogue of the fixt stars by ULUG BEIG, translated by himself out of the original of the interpreter Mr. HYDE, and likewise examined and corrected by himself according to the numbers of three Persian MSS. found at Oxford. 2. Of some observations concerning the *Stella Ceti*, first observed by Mr. JOHN PALMER. 3. Of the constitution of the Royal Society, according to the desire of Mr. HEVELIUS. It was ordered, that the amanuensis should make a copy of this letter, to be entered into the Letter-book of the society*.

Mr. WINDE was desired to speak to Mr. JONAS MOORE concerning Mr. HORROX's astronomical tables, and to procure them from him for the use of the society and the public.

There was made an observation concerning the proportion of the weight of lead to that of water; of which Mr. HOOKE was ordered to bring in an account in writing at the next day.

The experiments appointed for the next meeting, besides the above-mentioned concerning the compression of water, were as follow: 1. The prosecution of the of breaking several sorts of wood by weight, and particularly of cutting two strait pieces out of the middle of some oaken billet, wherein the grain will run arching. 2. The Magdeburg experiment with two bottles opening into one another, one containing water, the other air only, to be exhausted.

Mention was made by Mr. HOOKE, that a way might be considered of petrifying wood: of softening wood for easy carving, and then hardening it again; and of hardening wood, and making it lasting by boiling it in tar. The discourse of these particulars was referred to the next meeting.

April 20. At a meeting of the COUNCIL were present

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| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Mr. BALLE. |
| Mr. HOWARD. | Mr. PALMER. |
| Sir ROBERT MORAY. | Mr. COLWALL. |
| Sir PAUL NEILE. | Mr. HILL. |
| Sir PETER WYCHE. | Mr. OLDENBURG. |
| Mr. AERSKINE. | |

* Vol. i. p. 131, 132.

It was ordered, that the president, Sir ROBERT MORAY, and Sir PAUL NEILE, should be empowered to treat with Mr. SUTCLIFFE, concerning his pretensions to the house of Chelsea-college, and to offer him one hundred pounds to quit his said pretensions; as also to treat with Mr. COLE, concerning the land belonging to the said college.

It was ordered likewise, that the president should keep the paper of subscriptions made for Dr. CHARLETON by several members of the Society for contributing to a recompence for the care and pains, which the doctor was willing to take in anatomical administrations:

That the Society be moved to appoint Dr. CHARLETON to have the care of dissecting bodies for one year: And

That the secretary do write to Mr. HEVELIUS, and desire of him, that as the catalogue of the fixed stars by ULUG BEIG was sent him for his private satisfaction, he would not, by printing that catalogue, anticipate the Society's purpose of printing the whole book.

At the meeting of the SOCIETY on the same day,

The experiment of breaking wood was prosecuted; and there was taken, first, two pieces of fir, each two foot long, and one inch square; which were broken, the one lengthwise, with three hundred weight; the other transverse, with two hundred and an half. Secondly, two pieces of the same wood, each of three quarters of an inch square, and two foot long, were broken, the one lengthwise, with an hundred and a quarter; the other transverse, with an hundred weight. Thirdly, one piece of two foot long, half an inch square, broken lengthwise, with forty-one pounds. Fourthly, one piece cut out of a crooked oaken billet, with an arching grain, about three quarters of an inch square, two foot long; broken with three quarters of an hundred.

Mr. HOOKS shewed the experiment of compressing spirit of wine by a small glass-pipe in the manner of a spring; which so far succeeded, that there was a sensible compression of the spirit. He was ordered to try it at the next meeting with common water tinged.

Mr. BOYLE shewed an experiment with the same glass, to make a tad-pole live more freely in water, though under as great a pressure, as served to condense the air into a tenth or twelfth part of its place.

ISAAC VOSSIUS was proposed candidate by Dr. CHARLETON, and at the same time, because a foreigner, elected and admitted, without obliging him to any payment.

Sir ROBERT MORAY produced a great piece of fal gemmæ, lent him by Mr. ROBINSON, who had had it about thirty years, and got it from a person at Naples, who assured him, that he had had it in his possession above forty years. It had

had two little bubbles floating in a certain partition, each by itself, but both always uppermost, however the piece was turned. It was thought by some of the Society to be a liquor with some air in it.

Dr. CHARLETON mentioned, that Mr. WYLDE had an art of softening steel without fire, and hardening it again. He was desired to speak with Mr. WYLDE about it, to see whether he would impart it to the Society.

Dr. CROUNE mentioned the same, and that he intended to try it himself, promising to give an account of the success to the Society.

Sir ROBERT MORAY remarked, that Capt. SILAS TAYLOR had mentioned to him a gentleman, who pretended to discover some musical errors, generally committed by all modern masters of music, touching the scales, and the proportions of notes; and desired to be heard by some members of the Society versed in music. It was ordered thereupon, that the president, the earl of SANDWICH, Sir ROBERT MORAY, Sir PAUL NEILE, Mr. BOYLE, Mr. HENSHAW, Mr. BALLE, Dr. PELL, Dr. CROUNE, Dr. BALLE, and Mr. PACKER, be a committee to examine the matter on the Saturday following, about ten o'clock in the morning, at the president's lodgings.

Mr. PACKER mentioned, that yew-trees afford in building the best wood for strong and long lasting posts under ground; whereas posts made of many other kinds of wood will soon rot in the earth, unless they be somewhat burned, as far as they stick in the ground.

Dr. CHARLETON proposed an anatomical administration to examine Dr. WILLIS's observations of the brain, and to fit a skeleton, in order to consider the articulation and motion of the bones. It was ordered, that the operator take care to demand a body; and that in reference to it, the amanuensis draw up the copy of the warrant for such a demand, and attend the president to sign it.

Dr. CHARLETON moved, that the progress of the growth of tadpoles might be observed, they proving perfect frogs. Dr. MERRET was desired to observe of it what might be yet observed this year.

The experiments appointed for the next meeting were, 1. The Magdeburg experiment. 2. To compress water tinged. 3. To boil wood in tar. 4. To shew the ascension of water in syphons. 5. To prosecute the experiment of breaking wood by weight.

April 27. At the COUNCIL were present,

Dr. WILKINS, vice-president.
Sir ROBERT MORAY.
Mr. AERSKINE.
Mr. BALLE.
Mr. PALMER.

Dr. GODDARD.
Mr. HILL.
Mr. COLWALL.
Mr. OLDENBURG.

It was ordered,

That Dr. WILKINS, Dr. GODDARD, Mr. BALLE, Mr. COLWALL, and the secretary, be a committee to examine the accounts of Mr. HILL the treasurer, for the last quarter, from Christmas to Lady-day.

That the secretary write to Mr. HEVELIUS, and offer him the printing of ULUG BEIG, either in Persian and Latin, or in Latin alone: And

That he write likewise to Dr. WALLIS, and desire him to take occasion of proposing to Mr. HYDE to print ULUG BEIG in Latin only, without adding the Persian.

A letter of Col. LONG to the secretary, dated Apr. 13, 1664, was read, wherein he proposed to send up his boxes with insects and other curiosities of nature, to be put among the rest of the things, which were preparing for the king's reception: upon which it was ordered, that the secretary should thank Col. LONG for his respects to the Council, and acquaint him, that he should have timely notice of the day, when the king would visit the Society; and also inquire of him, since he mentioned shells lying over his vitriol-pit, what kind of shells they were; how thick and deep they lay; and what varieties of earth there were between the place where the shells lay, and the surface of the earth.

It was ordered, that the amanuensis should handsomely write upon parchment the diploma for Mr. HEVELIUS, and that Mr. SYMONDS be desired to attend the COUNCIL at their next meeting, for taking off the seal, and to have a silver box ready to put the seal in: And

That Mr. HOOKE direct the making of the two-wheeled engine, and the instrument for grinding glasses; and bring in a description of the instrument to make wheels for watches and clocks.

At the meeting of the SOCIETY on the same day,

The Magdeburg experiment with two glass-bottles joined together by a stop-cock, whereof the lower was filled with water, the other had nothing but common air in it, was tried, by applying it to the pneumatic engine, and exhausting the air out of the upper bottle; whereupon the water in the lower bottle, the stop-cock being opened, spouted up into the upper bottle, abundance of bubbles of air also rising after it into the same.

It was ordered, that the same experiment be repeated at the next meeting in other positions of the glasses, so that the water be above, and the air below; and that an account of both be brought in by Mr. HOOKE.

The experiment of compressing water tinged was tried, and succeeded, though but to a very small degree of compression: and Mr. HOOKE was ordered to give an account of it in writing.

Vol. I.

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Mon.

Monf. LE FEBVRE presented to the Society his book of chemistry, translated out of French into English.

He produced a retort, wherein he affirmed to have volatilized about twenty ounces of salt of tartar with a vast quantity of distilled vinegar and with spirit of wine, the process having lasted two years, and the shape of grapes appearing in the neck of the retort. He was desired to give the process of this in writing.

Mr. BERCHINSHA's paper on music^{*} was read, wherein he gave an account of the *defiderata* in music, and undertook to bring the art of music to that perfection, that even those, who could neither sing nor play, should be able, by his rules, to make good airs, and compose two, three, four, or more parts artificially. He was called in, and thanked for his respect to the Society, and assured, that the committee appointed at the last meeting to hear him, and to discourse with him upon this subject, should farther consider of it, and of ways to encourage and promote his design and study.

Dr. CHARLETON was desired to speak to Mr. WYLDK from the Society, that he would gratify them, by giving them directions how steel is to be softened and hardened without fire.

Mr. HOOKE was put in mind to make the experiment with a bird in compressed air, after another manner, at the next meeting.

The earl of ARGYLE was desired to make inquiry after the giant-child in Scotland (whereof Sir ROBERT MORAY had formerly brought in an account, which was registered) whether it be yet alive; and, if so, how it throve and grew.

Dr. PELL moved, that some experiments might be made upon May-dew in this season, concerning its weight, the salt to be drawn out of it, the insects generated from it, &c. He added, that a certain person, who had abundance of warts upon his hands, by washing them in the May-dew of several garden herbs, as balm, sage, &c. was perfectly cured of them before the end of May.

Mr. HENSHAW mentioned, that he had taken several ounces of pure salt out of a barrel of May-dew; and observed abundance of insects, and particularly of *millepedes*, bred in such dews. He added, that May-water put into a convenient vessel will gather a considerable cream on the top. He was desired, and with him Mr. EVELYN, to take care, that a good quantity of May-dew might be gathered, to make experiments with. And Mr. HENSHAW was particularly desired to bring an account in writing of those experiments, which he had already made, and to suggest new ones.

It was moved by Mr. BOYLE, that the salt of May-dew might be exposed to the air, and the alterations thereupon made in it, as to weight, and the like, observed.

^{*} It is a letter to the Royal Society, dated April 26, 1664, and is entered into the Letter-book, vol. i. p. 143.

He mentioned likewise, that the French *Theatrum Agriculturae* taught a way to make vinegar out of May-dew. The secretary was desired to consult that book, and to produce that passage at the next meeting.

It was desired, that the curators of these experiments of May-dew would gather several kinds of dew apart; as that of corn-fields, meadows, garden-herbs, each of them apart; there being conceived to be a difference in dew, according to the several vegetables whence it was collected: which impregnate it with several qualities.

Mr. BOYLE mentioned, that an acquaintance of his having gathered a quantity of May-dew, distilled half of it, leaving the other half undistilled; and that an hard winter following, the distilled water froze, but the undistilled not.

May 4. At a meeting of the COUNCIL were present,

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| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. HILL. |
| Sir PAUL NEILE. | Mr. COLWALL. |
| Sir PETER WYCHE. | Mr. HOSKYNs. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Mr. BALLE. | |

It was ordered, that Dr. WALLIS be written to by the secretary, and desired to press Mr. HYDE to translate ULUG BEIG, and not to transcribe the original till farther order: And

That the treasurer advance ten pounds to Mr. SUTCLIFFE, in part of payment of the hundred pounds, which the Society intended to give him for quitting his pretension to Chelsea college.

It was resolved, that it was best to solicit the king for the grant of Chelsea-house, and the land belonging to it, both together: and that it was fittest to stay the demand of the grant of Chelsea-house, till an agreement should be made about the land, it being best to have the house and land passed from the crown both together in one patent.

It was ordered, that the Monday's committee call upon those, who had undertaken to contribute experiments for his majesty's reception, to bring them in.

At the meeting of the SOCIETY on the same day,

The Magdeburg experiment was tried again in another position with success. It was ordered to be tried the second time at the next meeting, by exhausting the air out of the upper glass, and afterwards out of the water in the undermost glass.

It was ordered, that the experiments of *aurum fulminans* in steel balls be prosecuted; and that Mr. HOOKE provide balls fit for that purpose.

Mr. HOOKE was likewise directed to provide against the next meeting some *pulvis fulminans* of sulphur, salt-petre, and salt of tartar, as a *succedaneum* to *aurum fulminans*.

Dr. GODDARD was desired to bring in his account of the former experiments with *aurum fulminans*.

Sir WILLIAM PETTY was desired to give order to the operator for more experiments of breaking wood by weight.

Sir ROBERT MORAY promised to bring in writing the process of Monsieur LE FEBURE's operation of volatilizing salt of tartar with distilled vinegar and spirit of wine.

He informed the society of two experiments, which his majesty had lately made, by weighing himself before and after play at tennis. In one he found himself weigh three pounds less after the play of an hour and a half; in the other, weighing himself before he put off his moist cloaths, he found himself much lighter by twenty-six ounces, which was clearly exhaled.

Dr. WILKINS read a letter from Dr. POPE dated at Rome April 5, 1664, N. S. giving an account of some particulars observed in the kingdom of Naples; which was ordered to be entered, and was as follows:

" I received a letter from Mr. HILL, wherein he tells me you think it convenient I should write a letter to the Royal Society. Sir, I know both them and myself too well, to think, that any thing coming from me (especially about what I have seen in Italy, where a very great part of the society are more verled than I am) can be any way serviceable unto them: otherwise I should not at all value my pains. The journey of Naples, which I just now return from making, is certainly very worth relating; and I would venture upon it at your command, if I did not verily believe, that two worthy gentlemen of your society had already described it with much accurateness; and if they have not already made the society partakers of it, they will do it without fail at their return to England, which I suppose will be next autumn: I mean Sir J. FINCH and D. BAYNES. However, Sir, I will venture to you alone what we observed, which it may be they thought not worth the taking notice of. Both going and coming we dined at Terracina (which HORACE calls *Impositum faxis late candentibus Anxur*) we saw very eminent ruins of a most magnific temple of Jupiter ANXUR; but, what I chiefly mention it for, it is the best spot of earth for simpling that I ever yet saw in my life, there scarcely growing one common tree or herb; though it was a bad time, being early in the spring, yet we found very great variety of

† Letter-book, vol. i. p. 139.

" excellent

" excellent simples, both trees, shrubs, and flowers, many of which are not in
 " France in the best gardens, and scarcely known in Rome. We only could col-
 " lect the names of them, this being no time for feed. If the spring produce so
 " much, what might one expect from the summer and autumn? From Naples
 " we went to the famous Grotta de Cani, passing under the Paulilypus, which is
 " perforated for near a mile in the lowest place of such a height, as a man may
 " ride through with a half pike held up; towards both the ends much higher to
 " let in light; of such a breadth, that two coaches may meet therein. This
 " mountain is famed for bearing excellent Greek wine. The grotto of dogs is a
 " little cavity in the hill about twenty yards distance from the Lake Aniano; it is
 " about three yards long, a yard broad, and two yards high; and there is a door
 " to it, which must be opened with a silver key, before one can see the experi-
 " ment. In this grotto there arises very visibly a steam or cloud not above half
 " a foot high, to which if a lighted torch be admoved, it goes out as if put into
 " water. It did no hurt to us, that were in it, because the steam came not so high;
 " nay, putting in a weak dog, he came out holding his head up above the steam;
 " but when we held down his head, he fell down as dead immediately, and stirred
 " not. The ordinary experiment is this; hold a dog down below this steam
 " (which, besides that it is visible, the torch goes out at coming near it) he will
 " very suddenly, I am sure, in less than four minutes, appear dead, without any
 " kind of motion: if you would not have him die, take him, and throw him into
 " the lake (take heed of drowning him) taking him out again, he is immediately
 " well and runs about. The people thereabouts, and some authors, attribute a
 " strange revivifying quality to these waters, but I believe without sufficient
 " ground; for I doubt not but that any other water will do the same business;
 " but we could not, for want of other water, make the experiment. We took
 " two dogs, and put them at the same time into the grotto, till they both seemed
 " dead: we took them both out together, threw one of them into the lake, who
 " recovered instantly and run away: we laid the other upon the ground, expecting
 " what would become of him; after a good while we perceived him to begin to
 " breath; then he cried dolefully; he strived with much pain to get upon his
 " legs, but fell several times as if he had been drunk: when at last he could stand
 " upon his fore-legs, he could not for a while move his hinder-legs, as if his back
 " had been broke: it was above an hour before he recovered to go tolerably.
 " Sir, I doubt not but this steam is of the same nature with a damp in the coal-
 " pits, only this is perpetual; and it may be worth your inquiring, whether those
 " that are surpris'd with damps, would not recover sooner being put into the water,
 " than being let lie in the open air; which I have heard from a worthy gentle-
 " man of your society is the way, by which they recover them. If I should de-
 " scribe the Solfaterra, the mountain Vesuvius, and the natural fumes, I am cer-
 " tain I should tire you and myself, having already exceeded the bounds of a letter.
 " Pray, Sir, present my service to those of the Royal Society I have the honour
 " to be known to, &c."

Dr. CHARLETON gave some account of the laid anatomical administration; and
 said, that by his operation he had found Dr. WILLIS's cuts in the *Anatome Cerebri*, as
 far as he had gone, true: and that the bones of the body were boiled for the mak-
 ing of a skeleton.

He

He intimated, that to take off the whole skin, an anatomy must be made on purpose for it.

He also affirmed, that he had observed many differences between the brains of a man and a brute. He was desir'd to communicate his notes upon this subject to the society; as also to dissect some heads of a dog, sheep, calf, &c. to compare with the brains of a man, and to demonstrate those differences.

Mr. AUBREY was desir'd to speak with Mr. JONAS MOORE about the astronomical tables of Mr. HORROX.

A letter from Dr. WALLIS to the secretary, dated at Oxford April 30, 1664¹, was read, offering his own and Dr. WREN's service to the society in digesting Mr. HORROX's papers in order to their being printed, but desiring the originals, as the copies were very faulty: upon which the society ordered the secretary to return their thanks to Dr. WALLIS and Dr. WREN, and to acquaint them with the society's acceptance of their offer, and to send them all Mr. HORROX's and particularly the tables, as soon as they should be obtained from Mr. JONAS MOORE.

Mr. AUBREY mentioned a new way of brewing good and lasting beer with ginger without hops; and promised to procure some bottles of such beer for a proof.

Mr. HOOKE was ordered to agree with the diver between that day and the Wednesday following, to the end, that at the next meeting a day might be appointed for a trial of the new way of diving propos'd by himself.

Mr. BOYLE shew'd an experiment to elucidate the cause of the difficult division of two contiguous marbles, by a valve immerst in water; of which he promised to give an account in writing, together with other experiments lately made by him before the society.

Mr. HENSHAW's experiments and observations concerning May-dew were read, and ordered to be registered².

The operator was ordered to provide jars and glass-vessels for the May-dew.

Dr. CROUNE, by the hands of Mr. HILL, presented to the society his little treatise *De Ratione motus musculorum*³.

The operator was ordered to provide some tad-poles against the next meeting, in order to be cut open.

It was ordered likewise, that Dr. CROUNE, Dr. BALLE, and Mr. HOOKE take care at the next meeting to cut off some skin of a dog; and that the operator provide a dog for that purpose.

¹ Letter-book, vol. i. p. 130, 131.

² Original Register, vol. iii. p. 25. They are published in the Philos. Trans. n° iii p. 34.

³ Printed at London in 1664 in 4to, and reprinted at Amsterdam in 1667, in 12mo. It was published without the author's name.

May 11. The COUNCIL met, at which were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. Wilkins. |
| president. | Dr. Goddard. |
| Sir Robert Moray. | Mr. Hill. |
| Sir Paul Neile. | Mr. Colwall. |
| Mr. Aerskine. | Mr. Hoskyns. |
| Mr. Balle. | Mr. Oldenburg. |

The treasurer desiring to be directed, what kind of acquittance to take from Mr. Sutcliffe for the ten pounds ordered to be paid him, Mr. Hoskyns was required to draw up a form thereof.

It was ordered, that the president take home with him the society's seal, in order to have it handfomely taken off by Mr. Symonds for Mr. Hevelius's diploma; and that the amanuensis get the ornaments of the said diploma ready against Saturday morning, and carry it to the president, that it might be sealed and signed; and that the secretary dispatch it away by the first opportunity.

At the meeting of the SOCIETY the same day,

The Magdeburg experiment was prosecuted by exhausting the air out of the uppermost glass, and afterwards out of the water itself: whereupon the glass with the water turned uppermost, and the cock opened; the air remaining in the other glass ascended briskly into the water in great flakes, and the water descending with much more celerity than it did afterwards, when the air was let in again. To know the difference of the time whereof, it was ordered, that the operator should prepare the experiment again for the next meeting, to measure the time of the water falling down into the other glass filled with common air, and that of falling into the exhausted receiver.

The experiment of condensing air in a small glass with a sucker was tried, and succeeded well, the air being thereby compressed into the sixth part of the room, which it filled before. It was ordered, that at the next meeting a bird and a mouse be tried in this instrument.

Mr. Hooke proposed an experiment, to shew in what figure the glass-drops are broken by dipping them in ising-glass, and wrapping them about with some leather tied about with thread. He was ordered to make this experiment at the next meeting.

A description of this experiment, and a discourse upon it, and some other phenomena of glass-drops, made by Mr. Hooke, were read; and he was desired to shew the following experiment mentioned by him in the said discourse, viz. Take a glass-cane about a foot long, seal up one end, then put in a very small glass-bubble, almost of the shape of an essence-vial, with the open mouth towards the sealed end: then draw out the other end of the pipe very small, and fill the whole cylinder with water. Then set this tube by the fire till the water begin to boil,
and

and the air in the bubble be in good part rarefied and driven out: then, by sucking at the small pipe, more of the air and vapours in the bubble may be sucked out, so that it may sink to the bottom. When it is sunk to the bottom, in the flame of a candle or lamp nip up the slender pipe, and let it cool. Whereupon it is obvious to observe first, that the water by degrees will subside and shrink into less room: next, that the air or vapours in the glass will expand themselves so, as to buoy up the little glass: thirdly, that all about the inside of the glass-pipe there will appear an infinite number of small bubbles, which, as the water grows colder and colder, will swell bigger and bigger, and many of them buoy themselves up, and break at the top.

It was ordered, that the President, Sir ROBERT MORAY, Sir PAUL NEILE, Sir WILLIAM PETTY, Dr. WILKINS, Dr. GODDARD, Mr. HENSHAW, Mr. HILL, Mr. OLDENBURG, and Mr. HOOKE be a committee to see the experiment made of diving with the leaden box and pipe, on the Tuesday following in the afternoon, meeting at Sir ROBERT MORAY's chamber; and that the operator appoint the diver, and make the instrument ready for that time.

A letter from Mr. BEAL written to the secretary concerning the transplanting of the East-India spices in the West-Indies, was ordered to be communicated to Mr. POVEY, in order to recommend that work to the council for foreign plantations; and Mr. POVEY gave some account of what had been formerly in design concerning it, and promised to promote the same with all possible vigour, and to report to the society the progress, that should be made therein.

The experiment of heating both common and fulminating powder in steel-balls was referred to the next meeting, and Mr. HOOKE was ordered to provide fulminating powder.

The gathering of May-dew being inquired after, and the operator informing the society, that some had been sent in by Mr. HOSKYNs, it was ordered, that some of it should be put apart, in order to observe the effects of its putrefaction; and that some cotton or wool should be steeped in it, to see what quality it would contract from thence.

Mr. BOYLE remarked, that the way of gathering a quantity of dew without sheets, was to make use of a great glass filled with cold water; or rather, if it could be gotten, with ice or snow; whereby the dew dropping upon it will be condensed, and fall down all along the sides of the glass, like a still.

May 18. At the meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. PALMER. |
| president. | Dr. WILKINS. |
| Mr. HOWARD. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. HILL. |
| Sir PETER WYCHE. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |

The

The president returned the society's seal, which was put again into the chest with three locks, the diploma of Mr. HEVELIUS having been sealed therewith, bearing date May 11, 1664, and being sent away by sea to Dantzick.

A motion being made by the president and Sir ROBERT MORAY on the behalf of Mr. POVEY about the reimbursing him the 23 l. which he affirmed to have expended for the society upon the account of treating with Dr. KILLEGREW¹ for the Savoy by order of the council, for the use of the society, though the said treaty proved successless by reason of some conditions judged by the council not fit to be accepted of; it was ordered, that the treasurer of the society should reimburse Mr. POVEY the said 23 l.

It was ordered likewise, that the president, Sir ROBERT MORAY, and Sir PAUL NEILE should be desired to speak with Mr. WILLIAMSON² concerning the best way of procuring from his majesty the grant of Chelsea College: And

That Sir ROBERT MORAY should speak with Mr. COLE, and inform him, that when the society shall have obtained the grant of Chelsea College, both of the house and land belonging to it, they will then contract with him for his interest in that land at a marketable rate.

At the meeting of the SOCIETY on the same day,

The experiment concerning the force of common gunpowder was tried by putting a small thimble-full of such powder into a thick cylindrical piece of steel, having a little cavity in the middle, and closed with an exact screw; which being heated in a coal-fire, burst in two places, throwing out the screw. It was ordered, that the experiment should be repeated at the next meeting in as strong a piece of steel, as could be well made, and with as much care of preventing any vent, as might be. And Mr. HOOKE was appointed curator thereof.

Sir ROBERT MORAY gave an account of the diving experiment, and the unsuccessfulness thereof at the first trial. It was ordered, that the diver should pursue the experiment, by attempting frequent practices thereof; for which end the engine should be left with him. Mr. HOOKE was ordered to take care of the performance of it, and to make a report to the society of the success.

Mr. HENSHAW brought in writing some additional experiments to be made with May-dew; which were ordered to be registered³; and the operator was directed to try as many of them as he conveniently could; and Dr. GODDARD was desired to supervise him.

The secretary produced two letters written to him from Oxford by Dr. WALLIS, one of May 7, 1664⁴, and the other of May 14⁵, containing his thoughts upon the musical proposals of Mr. BERCHENSHA. It was ordered, that these letters

¹ Master of the Savoy.

² JOSEPH WILLIAMSON, esq;

³ Original Register, vol. iii. p. 23.

⁴ Letter-book, vol. i. p. 149.

⁵ Ibid. p. 152.

should be referred to the president to peruse and consider them, and to make report thereof to the society; and that Dr. COTTON should be added to the musical committee appointed April 20, 1664.

The secretary produced likewise another letter from Dr. WALLIS of May 16, relating to the fall of hail at Oxford, the hail-stones being like a lump of ice, very transparent towards the sides, but more opaque towards the middle, of very irregular shapes, and of the bigness of $\frac{1}{2}$ of an inch in diameter.

Sir ROBERT MORAY related, that some years ago there had fallen a storm of hail at Lyons, which had done so much mischief to the houses of that city, in breaking the windows and tiles thereof, that it was not repaired for less than 100,000 crowns, the hail-stones being of the size of tennis-balls, and killing a great number of men and beasts.

Mr. BOYLE related; that a servant of his travelling some time before over a common in Lancashire, had observed, that whenever the horse struck the ground of that common, there appeared flashes of light, which continued a good while. He was desired to give in writing a punctual account of this observation.

Dr. CHARLETON cut off a piece of a dog's skin, to try, whether it would grow on again.

He opened some tad-poles, and said, that he found in them the rudiments of frogs. He was desired to prosecute the experiment, and to let the society be more fully satisfied about the production of frogs from the said tad-poles.

Mr. HOOKE mentioned, that he knew a person, who had the art of softening steel to that degree, that it might be twisted. He was desired to endeavour to get the secret, and to offer a reward for it.

Dr. CHARLETON was put in mind to speak to Mr. WYLDE concerning his way of softening steel without fire, and hardening it again. The doctor promised to endeavour to procure it of Mr. WYLDE.

Dr. CLARKE mentioned, that he had seen a dog's spleen cut away by Mr. PEIRCE without tying up the vessels thereof; and that the dog survived and was well. It was ordered, that the experiment be made before the society by the care of Dr. CLARKE and Dr. CHARLETON; and that the operator provide a dog for that purpose.

The secretary produced a roll of some skins of parchment sent by Mr. BEAL for the use of the society, made by one MATTHEW WILLS of Yeovil, esteemed by many the best parchment-maker in England. This roll was accompanied with a letter addressing the said present, and with a description of the art of making parchment, together with the figures of the several tools used in this art. It was ordered, that the said description be read at the next meeting.

The

The experiment of condensing the air upon a bird was tried with this success, that the bird was killed; and being opened, the heart and lungs of it were found to be much blown. It was ordered, that the experiment be repeated at the next day with a mouse; and that a bird be put into the same vessel without condensing the air, to see how long it would live therein in the common air.

It was ordered likewise, that a carp's bladder be provided against the next meeting, to be put into the same vessel: as also some tender worms, and black snails, to see what effect the compression of the air would have upon them.

Mr. HOOKE tried his experiment of breaking a glass-drop dipt in ising-glass, and tied about in a piece of leather; but it not succeeding, he was ordered to try it again at the next meeting.

May 25. At the meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. Whistler. |
| president. | Dr. Goddard. |
| Sir Robert Moray. | Mr. Colwall. |
| Mr. Aerskine. | Mr. Hill. |
| Mr. Balle. | Mr. Hoskyns. |
| Dr. Wilkins. | Mr. Oldenburg. |

It was ordered, that the President and Sir Robert Moray be desired to prosecute the petition for the grant of Chelsea College, and present such a petition to the king.

At the meeting of the SOCIETY the same day,

The Magdeburg experiment being repeated, it was found, that the proportion of the time of the water's running into the exhausted glass to that of its running into the glass filled with air, was as 7 to 8. It was ordered to exhaust it better for the next meeting.

Three glasses filled, one with May-dew, the other two with river and pump-water, and having mint put into them, were viewed; and it was found, that in the two glasses, that were filled, one with river and the other with pump-water, the mint was fresh; but in that with May-dew, the mint, though of the same root with the other, was decayed.

Dr. HENRY MORE was again proposed candidate by Dr. WILKINS, and immediately elected, having been formerly chosen by the first charter.

THOMAS NEILE, esq; was proposed candidate by Mr. HOSKYNs.

The experiment with common gunpowder in a cylindrical piece of steel with a little cavity, screwed close, was tried again, but without success; the powder find-

ing vent between the steel case and the screw. It was ordered, that Mr. Hooke should provide the strongest method he could, against the next meeting.

Dr. CHARLETON mentioning, that the dog, a piece of whose skin had been cut off and sewed on again, had got it off; he was desired to repeat the experiment at the next meeting, and think upon a way of securing the patch.

Mr. BEAL's account of the art of making parchment was read, and ordered to be registered ².

It being mentioned, that there was a kind of parchment as transparent as glass; the president, who had seen such, was desired to procure some of it to shew the Society.

The experiment of compressing the air upon a mouse was tried; and it was found, that she lived, though the air was compressed to a fourth part of the space, which it filled before. It was ordered, that the experiment be tried at the next meeting with some tender worms and black snails.

The experiment of compressing the air upon a carp's bladder was tried; and it appeared, that one part of the bladder was crushed by the compression of the air into three fourth parts.

Dr. CHARLETON being called upon for Mr. WYLDE's art of softening steel with fire, and hardening it again, made answer, that he had spoken to him concerning it; but that Mr. WYLDE esteeming it a secret, he thought not fit to press him for the communication thereof. Dr. CHARLETON was desired to let Mr. WYLDE know, that the Society only requested to be assured of the matter of fact, and to see such a thing produced before them.

The experiment with the mouse in compressed air was tried, by putting the glass in a pail of cold water; where, the air being condensed into an eighth part, the mouse remained alive, and was well. Hence it was inferred, that a man may breathe under water at the depth of 200 fathoms, if he can breathe and live with as thick air, as a mouse can do.

Dr. COTTON produced several pieces of rude lead-stones, taken up in Devonshire near Brent, some above ground, some under ground, though pretty near the surface. He affirmed, that a great number of iron mines were near this place. Some of these lead-stones were tried and found pretty good.

He produced also several sorts of tin-ore, one of which was taken out of a place, where the people digging it were stifled with the damps of the mine. Another sort was found in the same mine, where silver-ore was digged up. He brought in an account of this and other particulars about tin-mines, which was ordered to be registered ³, as follows:

² Original Register, vol. iii. p. 35.

³ Ibid. p. 30.

“Where

“ Where there is any load of tin, there are usually found somewhat near it
 “ shoad-stones, smoother than those stones mixed with the tin in the load : these
 “ stones are sometimes loose on the turf, often turned up with a plough in
 “ arable ground. When these are discovered, they examine from the shoad up-
 “ wards towards the hill, by sinking several shafts, from four to seven or eight
 “ foot deep, until they are past that, which they call the loose country, that is,
 “ a looser sort of earth or sand usually about three or four inches thick ; under
 “ which if they find any tin-stone, they perceive the load is very near, and they
 “ seldom or never fail of finding it.

“ The load is known by the several colours it hath different from the other
 “ earth, and by some walls of stone or list of earth on each side of it, different in
 “ colour from both the earth and the load. The load is rarely three yards broad :
 “ one in Godolphin-ball was eleven foot ; others one foot, half a foot, and much less.

“ The load, when mixed with stone, they call spar ; when with dust or sand,
 “ prian.

“ It is observed, that all the principal loads do lie from east to west, or some-
 “ what inclining that way ; but if they meet with cross-loads, from north to south,
 “ they are very inconsiderable ; and the true load, when the cross-load comes
 “ near it, breaks off from that line it was formerly in, and is removed sometimes
 “ six or ten foot distance from it. The loads are some of white, others of red,
 “ others of black, others of brown colours ; and when washed, they tinge the
 “ water accordingly. Though it be usual, that the same load keep the same co-
 “ lour, yet there is an instance in a load at Godolphin, which at three several
 “ places has three several colours. Of whatever colour the load be at first, it
 “ comes afterwards, when thoroughly washed, to be of a black colour, and is
 “ generally called by the name of black-tin, to distinguish it from the load and
 “ melted tin.

“ When the load is taken out of the mine, the greater stones are broken into
 “ small, and then carried to the stamping-mill, and is stamped with iron stamps
 “ in a little vessel of water, which water running away through an iron plate full
 “ of small holes, carries with it both the dross and tin ; which being afterwards
 “ received into two or three successive pits, it is there buddled either with mens
 “ feet or with a shovel, which moving it up and down, separates the stones and
 “ dross from the true metal. The parts remaining, not stamped small enough, are
 “ put again either into a crazing-mill, and ground between two stones, or the
 “ same stamping mill ; and then the plate of the stamping-vessel is changed, and
 “ the water, together with the tin, passeth out from that vessel through smaller
 “ holes. Sometimes they lube the same tin, by stirring it in a wooden vessel, and
 “ striking the vessel with a staff, which makes the tin settle at the bottom ; and
 “ they scum off the top, which is waste.

“ Being thus separated and made small, it hath now the name of black-tin, and
 “ is measured by dishes, which contain a gallon apiece. It is from thence carried

“ to the blowing-house, where being cast, together with charcoal, into a furnace, as it melts, by the force of a wall-bellows, it flows out into a stone trough, and there they scum off the top of it, which is like black pitch, and is called cinders: this they do not cast away, but stamping it again together with the tin-stone, it adds to the quantity of the tin.

“ In the melting of the tin, some of the lighter parts of it are blown off, and stick in the several parts of the blowing-house, which they cannot well take off; and for that reason they seldom repair those houses, but rather burn them, and the tin found in them will be sufficient to build a new house. When the fire is too hot, it makes the tin more apt to fly; which when they perceive, they endeavour to remedy by casting water on it. When the cinders are scummed off, they put the tin into moulds, which contain about three or four hundred weight apiece, and the owner's mark is affixed on it. It is then called white tin, and is from the blowing-house carried to the coinage, where being poised and tested, that is, examined, by cutting off parts, whether it be pure and soft, then it passeth without tarring, and the king's stamp is set on it: if otherwise, it is tarred, that is, lessened in price, two, three, four, and five shillings, sometimes fifteen or twenty shillings, a hundred. The hundred is one hundred and twenty, rather one hundred twenty-two pounds weight. Three or four gallons of the best black-tin usually makes one hundred weight of white-tin: this the farmer buyeth of the owners at four pounds ten shillings the hundred, but sells it at five pounds and upwards to the merchant; and the hundred, by which they sell, is one hundred and twelve pounds weight.

“ There is priant tin, mixed with earth and clay, often found in low grounds, above the shelf or hard earth: this they work, by conveying it through a trough of water, which running through the places they dig, and separating the tin from the earth, by the help of the labourers, give to them the name of stream-works.”

He likewise mentioned an experiment made by him, of weighing a ponderous body both above and under ground; of which he promised to give an account in writing at the next meeting.

The weight in the above mentioned experiment being found lighter at the bottom than on the top, it was thought worth the examining, whether it proceeded from the different degrees of heat and cold, or from different degrees of thickness, as that is caused by more or less weight of the air: and for this purpose it was ordered, that Dr. COTTON and Dr. POWER should be desired, the latter by Dr. CROUNE, to take a globular glass of about a pound weight, and to weigh it at the top and bottom, to examine the constitution of the medium: for if the difference of the weight arises from the thickness and thinness of the air, the glass will weigh much less below than above ground; if it be from heat and cold, a sealed thermometer was thought fittest to determine that.

Dr.

Dr. COTTON produced a paper, containing a story of a moorish place near Kilmington in Lancetson-road, where the impreis of some horses and mens feet in the ground had appeared fiery, and much more shining than glow-worms; the grafs gathered in that place keeping the lustre in mens hands for a good while: which paper was ordered to be regislered^b, as follows:

“ Being Monday, on my return with Sir JOHN CORITON, bart. and his clerk, WILLIAM STEPHENS, from the lord bishop’s visitation at Lancetson, about an hour, in a misty dewy night, at Hinxen, almost a mile beyond Kilmington in Devonshire, in Lancetson road, in a moorish place of some forty foot in length, the impreis of our horses and our own feet upon the ground appeared fiery, much more fiery than glow-worms; the grafs we gathered in those places, where we or our horses trod, reserved the lustre in our hands, e’er we came to the water within a quarter of a mile from Kilmington, where watering our horses we observed it, but almost extinguished, only a spark here and there: at Newton, two miles thence, we viewed it by candle-light, as alto the next day, and found it coarse spiry grafs, of an inch or little more in length, such as ordinarily grows on downs.”

Mr. BOYLE acquainted the Society with his intended recess into the country, and being desired to bring in writing the account promised by him, of the Pascalian experiments, before he left London, made answer, that he would leave this matter with Mr. HOOKE to prosecute the said experiments, and to give an account thereof.

It was ordered, that the diving experiment should be prosecuted in the Thames; and that it be made likewise in a tub before the Society at the next meeting; when the diver should be summoned to attend.

Dr. CROUNE offered to make an experiment at the next meeting, of choaking a chicken, and of reviving it by blowing with a quill into the lungs. It was ordered, that a chicken be provided by the operator for that purpose.

June 1. At a meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. Goddard. |
| president. | Mr. Hill. |
| Sir Robert Moray. | Mr. Colwall. |
| Sir Paul Neile. | Mr. Hoskyns. |
| Sir Anthony Morgan. | Mr. Oldenburg. |
| Mr. Aerskine. | |

The petition to the king for granting the house of Chelsea-college, and the land belonging thereto, to the ROYAL SOCIETY, was read, and, after some alterations, agreed upon, as follows:

^b Original Register, vol. lii. p. 33.

“ To

“ To the KING's most excellent majesty,

“ The humble petition of the President, Council, and Fellows of the
“ ROYAL SOCIETY of London for improving natural knowledge,

“ *Humbly sheweth,*

“ **T**HAT the house called Chelsea-college, and the land heretofore belonging
“ thereunto by the donation of your majesty's royal grandfather, king
“ JAMES, of blessed memory, are now (as your petitioners do humbly conceive)
“ at your majesty's disposal.

“ Your petitioners therefore do humbly pray, your majesty will be graciously
“ pleased to give order, that a bill be prepared for your royal signature, granting
“ to your petitioners and their successors the said house and lands, that your pe-
“ titioners may thereby be in some measure enabled to prosecute the design, for
“ which your majesty was pleased to constitute them a corporation.

“ *And your petitioners shall ever pray.*”

It was ordered, that the president, Sir ROBERT MORAY, Sir PAUL NEILE, and
Mr. AERSKINE, be desired to present this petition to his majesty, as soon as may
be: And.

That Mr. HILL the treasurer do pay to Mr. SUTCLIFFE the sum of ten pounds,
and take a receipt for the same, notwithstanding former order.

At the meeting of the SOCIETY on the same day,

Dr. HENRY MORE was admitted; and Mr. THO. NEILE elected.

The experiment of breaking a case of steel with gunpowder was repeated; and
there was taken two penny-weight and an half of powder, and put into the little
cavity of the said case, and a screw wrought into it as exactly as was possible.
The event was, that the case being heated, the powder broke a little hole through
the bottom of it. The Society conceiving, that the case was not wrought equally
strong, ordered, that it should be tried again at the next meeting, and that the
case should be as even and strong as could be; and Mr. HOOKE be the curator of
the experiment.

The Magdeburg experiment was repeated, and the time of the water's running
out of one glass into the other exhausted glass, being compared with that of the
water's running out into the glass with intromitted air, it was found by a minute-
watch, that the time was two minutes to four. It was observed also, that the
water ran out into the exhausted glass with very little noise; and that the glasses
being inverted so, as that the exhausted one of air was beneath, and that which
was full of water (freed also from air) above, there ascended (to shew that always
some

some air is remaining, notwithstanding the most careful exhaustion) large bubbles into the glass with water; which bubbles were like flakes, rising up with a smart motion.

Dr. CROWE made the experiment of choking and reviving a chicken with good success; for having choked with his finger the chicken in such a manner, that there appeared no signs of any more life, he put a slender glass-pipe into the throat of the fowl, and through it blew air into its lungs; whereupon within a little time it came to itself, and lived again. It was ordered, that at the next meeting two chickens should be choked, and one of them blown into, the other not, to see whether both would recover.

The diving experiment was tried, by sinking the leaden box with air under water in a tub, and letting the operator respire the air in the said box by a pipe, his nose being kept stoppt all the while of his drawing in the air of the box, which lasted four minutes by a minute-watch, but might have been continued longer, if the operator had stood in a more convenient posture.

Dr. COTTON's experiment of weighing a piece of brass above and under ground was read, and ordered to be registered, as follows:

"In my inquiry after tin-works, understanding there was at Godolphin-Ball one perpendicularly sunk thirty-five yards deep, I went to it, and having examined its depth, I took a twine of thirty-six yards long (which weighed a quarter of an ounce) and unhooking one of the scales, in which it was weighed, I tied one end of the twine to the ring, from which I unhooked the scale, and the other end of it to the hook of the same scale, putting half a pound weight of brass in each scale, and a quarter of an ounce more in the scale above the earth, to counterpoise the twine tied to the other scale, which one of the tinner's carried down to the bottom of the mine. The tinner in the bottom of the mine having that scale in his hand, which was tied with the twine to the end of the beam, I and others of the company, who were with me, held the beam of the scales over the mine about three or four foot above the surface of the earth, and causing both scales to be left at liberty, we found, that the scale above the earth was much too heavy for the scale in the mine. Whereupon we took out of the upper scale the quarter of an ounce, which was placed in it, as a counter-balance against the twine, which tied the lower scale to the beam: that being taken out, the weight seemed even, the beam appearing parallel to the earth, and the tongue perpendicular. We then demanded of the tinner in the mine, how far the scale was from the bottom, and he telling us about two foot, we held the beam about two foot lower, and then perceived the higher scale much to preponderate, the other scale touching the bottom of the mine: then raising the beam two or three inches, the lower scale did preponderate, till we directed the tinner to examine, whether any earth stuck about the lower scale, which he finding and wiping it off, the balance became even, as formerly; or rather the higher scale a little preponderating."

Original Register, vol. iii. p. 34.

V. OL. I.

K k k

Dr.

Dr. CHARLETON reported from Mr. WYLDE, that he had promised to shew the society, as soon as conveniently he could, the experiment of softening steel without fire, and of hardening it again.

Mr. BOYLE shewed the lateral pressure of liquors with a pipe bent at right angles; whereby having put oil of turpentine into the greater pipe, and closed the top of it with his finger, he immersed it into water; by the forcing of which in at the hole of the smaller end, the oil was driven up to an equal height with the surface of the water.

The lord BRERETON being desired to give the society an account of the logs rising in a lake belonging to him, as often as the head of his family approacheth to death, related, that he had not long since, upon his father's death, made a very strict inquiry after it, but found cause to believe that tradition false.

Mr. BOYLE shewed the society a volatile salt of anniseeds, having the genuine smell and taste of anniseeds, but unlike to all kinds of volatile salts, whether acid, sulphureous, or urinous.

He suggested it as worth the inquiry, whether volatile salts, though they affect the taste equally, are equal or not in weight, so that by weighing them it might be found, of what kind this or that volatile salt might be, according as it should prove heavier or lighter.

Mr. PACKER produced a piece of an elm-bark, which, after it was cut, seemed on the outside petrified. He promised to give the account of it in writing.

It was referred to the next meeting, to consider of the best way of putting the committees lately established upon action; in order to which the secretary was directed to have then in readiness such papers, as have been addressed to him concerning several matters of the cognizance of those committees, to recommend them to their consideration; and also to cause the amanuensis to have ready a list of the said committees, and of all the persons nominated for them, to be put up in the public meeting-place of the society.

Mr. HOOKE was ordered to bring in two or three good experiments at the next meeting.

Dr. CHARLETON was desired to bring in his observations concerning the differences between the brains of a man and brutes.

June 8. At a meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Mr. HOWARD. | Dr. WHISTLER. |
| Sir ROBERT MORAY. | Mr. PALMER. |
| Sir ANTHONY MORGAN. | Mr. HILL. |
| Mr. AERSKINE. | Mr. COLWALL. |
| Mr. BALLE. | Mr. OLDENBURG. |

The validity of Dr. DACRES's election into the place of professor of geometry in Gresham-College^a being questioned, upon information given, that the lord mayor of London was not of the committee, and yet by his presence had carried the election by a casting vote; it was ordered, that Dr. WILKINS, Mr. PRIMER, and Mr. COLWALL be desired to consult Mr. ELLISE about this business, how it might be redressed, to do justice to Mr. HOOKS, who had five votes, whereas Dr. DACRES had but four, exclusive of that of the lord mayor; and that in order to this redress, they should well inform themselves, whether the lord mayor was nominated one of the committee; or else, whether he was of custom authorised to be always of every committee, if he pleased to be so.

SIR ROBERT MORAY acquainted the council, that the petition for the grant of Chelsea College was presented to the king; and that Sir HENRY BENNET, one of his majesty's principal secretaries of state, was to receive his orders for a reference upon it.

It was ordered, that Dr. MORE and Dr. PELL be excused from all payments till farther order: And

That the keeper of the repository deliver nothing out of it without a written order.

At the meeting of the SOCIETY on the same day,

Mr. EDWARD SMITH was admitted.

The powder experiment was tried again with a stronger case of steel, and the quantity of two penny-weight and an half in the small cavity thereof, the screw being very exactly put in. The event was, that the case cracked on the upper side, the screw remaining firm in its place. It was ordered, that it should be repeated at the next meeting with a yet stronger case, a less cavity, and less powder, and as deep a screw as might be.

The experiment of breaking two pieces of fir, one horizontally or transversely, the other perpendicularly or directly, was made after this manner: each piece was cut cross the grain: both were of an inch diameter in the place where they were to be broken. One of them was laid horizontally; the weight put on at six inches distance from the place where it was to be broken, which was done with 9 pounds 4 ounces and a quarter, besides the weight of the piece itself of eight inches long, and an inch and an half square. The other was broken perpendicularly in the

^a Upon Mr. ISAAC BARROW's resignation of the professorship of geometry in Gresham-College, the Royal Society, who met there, were desirous, that Mr. HOOKS might be chosen to succeed him; since by that means he would be near at hand to attend their service, with greater readiness for them, and less trouble to himself. But ARTHUR DACRES,

M. D. being competitor with Mr. HOOKS, the election was declared in favour of the former on the 20th of May 1664, and he was accordingly admitted, but resigned upon the 26th of March following, and was succeeded by Mr. HOOKS. Dr. WARD's Lives of the professors of Gresham-College. p. 169.

place, in which it was designed to be broken; which was done by 163 pounds and $\frac{1}{2}$ of an ounce. It was ordered, that this kind of experiments be prosecuted by Mr. Hooke in other kinds of wood, to see, whether the same proportion holds therein.

Sir ROBERT MORAY produced the extreme part of a substance supposed to be either of the horn or tooth of that fish, which some months before run it into the lower part of an English ship not far from Barbados, and, to disengage himself, had with great force broken it off, raising in the struggling so great seas, that being cast into the ship, they reached as high as to half the mizen-mast, according to the relation of the master of the ship, who had brought it home, and presented it to his majesty, from whom Sir ROBERT MORAY brought it to the society, who desired him to make their acknowledgments to his majesty for this grace and favour.

This piece being weighed in air and water, it was found to weigh in the air 13 ounces 10 penny-weight 9 grains; in the water 6 ounces 14 penny-weight 20 grains; the difference being 6 ounces 15 penny-weight 13 grains. The water to the horn was almost as 1 to 2.

Monfieur COCK, a Swedish gentleman, being, upon the motion of the secretary, permitted to be present at this meeting, produced several sorts of ore, and some petrified pieces in Pool's hole in Derbyshire; among which there was one piece of tin-ore, dark-brown, shining, variously figured, and heavy, supposed by the producer to be almost all perfect tin. Being weighed in air and water it was found to weigh in the air 3 ounces, 8 penny-weight, $11\frac{1}{2}$ grains; and in the water 2 ounces, 17 penny-weight, $6\frac{1}{2}$ grains, the difference being 11 penny-weight 5 grains. The water to the tin-ore was as 1 to $6\frac{1}{3}\frac{1}{4}$, that is, as almost 1 to $6\frac{1}{2}$.

Dr. CHARLETON's discourse concerning certain differences observable betwixt the brain of a man and the brains of other animals, was read, and ordered to be transcribed¹, and kept for the comparing of the particulars thereof with the *anatomia* in anatomical administrations; as also to be communicated to Dr. WILLIS, several of whose opinions, delivered in his *Anatome Cerebri*, are therein impugned. It was ordered likewise, that what shall pass between those two doctors upon this occasion, shall not be made public without their consent.

Mr. BOYLE related some observations of his concerning the effects of a clap of thunder and lightning on the 7th of that month of June, about four in the afternoon, about the sign of the Poet's head on the high-way, going up from St. James's house. This account was seconded by the following one of Mr. Hooke in writing, which was ordered to be registered², as follows:

"I had almost all the morning observed very odd commotions of the air, such as I have several times before taken notice of to precede thunder: that is, I took notice by means of the motion of several clouds, that were in very different

¹ A copy of it is extant in Prefa B. B. vol. B.

² Original Register, vol. iii. p. 41.

" stations as to their hight, that there were several very swift currents of the air
 " above, the highest moving very swiftly to the north, the next below that toward
 " the fourth-east, and the air below was very variable, and for the most part dis-
 " ing : and this was much more conspicuous, by reason of the clouds, a little be-
 " fore the thunder began, which was about three o'clock.

" I had taken notice of several pretty big claps of thunder before that, and had
 " likewise observed what I had done very often formerly at other times ; namely,
 " that the rumbling noise after the first great clap seemed to be several echos
 " from distant places : next that presently after the noise of the thunder-clap, the
 " rain began first to fall ; and if it rained when it thundred, it immediately after
 " the clap poured down much faster, much as if a gale of wind had suddenly
 " shook a tree, all whose leaves are full with drops of water.

" The flash of the lightning, and the noise of the thunder, were both as great
 " as I have seen or heard in the day-time ; the light being so great, that I started
 " at it, it giving a sudden glaring flash of light upon the paper, on which I was
 " looking, as if some powder had been kindled hard by me ; and presently look-
 " ing out of my window, which stood open, I heard a hideous crack of thunder,
 " which seemed to me just over the very house where the mischief was done.

" About an hour or two after I was informed of the hurt the lightning had done
 " to a man and a house in Piccadilly, just over against St. James's ; and going
 " immediately to see it, I found the outside of the house in several places torn,
 " the west corner of the roof being very much torn, the tiles being thrown off, the
 " laths beat inward, and a good part of the brick wall thrown out into the street :
 " the great middle bars of the western windows were strangely torn ; the whole
 " pieces of timber much shaken, and yet for the most part the glass, that was near
 " it, was whole. It had much torn likewise the timber, bricks, and glass of the
 " highest north-west window ; the lowest north-west window was singed as it were
 " in two or three places, and the lead a little melted, and the timber somewhat
 " blacked ; but the glass was not broken, that was held by those melted leads. It
 " had likewise broken a great splinter out of a door that looked eastward, and
 " much torn the brick-wall hard by it.

" Going into the house I found the man, that had been hurt with the lightning,
 " who was an old bird-catcher : he was very much bruised about the face and all
 " bloody, spitting out of his mouth very much blood, which seemed to come
 " from his mouth only, and not from any hurt within. I could not get any words
 " from him, but the man, that was by him when he fell, and was struck down
 " upon his knees also, told me, that he felt nothing but a sudden strong wind ;
 " but that the other was struck down dead, or in a swoon. The man the next
 " day was pretty well, but very sore about the head and face. Viewing the house
 " from top to bottom, I found the highest room or garret to be most hurt. The
 " ceiling just under the place, where tiles were beaten off, was beaten all down
 " upon the floor, and through the brick-wall just by it there was a hole made
 " about an inch over, as if a bullet had broke in ; and from it to the window,
 " which

“ which was about a yard, the wall was rased very deep, as if a great bullet had rased it; and the window was very much shattered and rased as if it had been beaten; but there was no sign any where on the wood of the impression of a bolt, but several parts of the wall were rased, as if bullets had grazed on them.

“ A fellow, that kept the gate, told me, that he was standing at his door when the flash came, and that he saw it come from over St. James's-house, and dart upward toward this corner with exceeding great celerity, looking like a piece of glowing red-hot iron: that he saw not whither it went, but heard a great noise at the corner house, besides the hideous crack of thunder. That presently looking into Piccadilly, he saw a pease-cart overturned, horses and all, and the two men fallen: a woman sitting in the cart was much bruised by the fall of the cart upon her, but the horses were not hurt. There were also several brickmakers and carpenters on the other side of the way, which were all overturned by the violence of the wind; but none hurt.

“ One, that was sitting for shelter under a penthouse, told me, that he saw not the fire, but only the light of the flash; that two men, that were at the other side of the board against which he leaned, were both struck backwards, but without any hurt. That it removed him from the corner to the middle of the seat, but hurt him not. That he smelt a great smell of brimstone, and was almost deaf with the noise of the crack: in which last particular they almost all agree, some saying it smelt like brimstone, others like gunpowder.

“ I could not perceive any sign of fire, but only in one place of the outside of a window, where it had a little melted the lead, and a little smutted or singed the place; most of those effects seeming to have proceeded from a violent motion of the air.”

Mr. PACKER brought in writing what he had related at the preceding meeting concerning a piece of an elm-tree, which was outwardly petrified. It was ordered to be registered^s, and was as follows:

“ On a bank in a close of Mr. PUREFOY, a little beyond the sheep-pens, near his house called Wadley, a mile from Farringdon in Berks, there grows an elm, which hath now lost the top and is grown hollow, containing near a tun of timber: from the butt of the said tree, one of the spreading claws having been formerly cut off with an axe, that part of the butt, from whence the same was severed, being about a foot and half above the ground, and inward within the trunk of the tree, hath contracted a petrified crust about the thickness of a shilling all over the woody part within the bark, the marks of the axe also remaining very conspicuous with this petrified crust upon it. By what means it should thus happen, cannot well be conceived; in regard there is no water near it, the part above the ground, and out of the weather, the tree yet growing, unless being cut at some season when the sap was flowing, the oozing of the sap might become petrified by the air, and the tree become rotten and hollow

^s Original Register, vol. iii. p. 40.

“ inward

"inward since that time, which how long since, is not known. This is a piece
"of that cut off by Mr. PACKER in March 1663."

Mr. PACKER related some considerable observations about damps in certain mines: which he was desir'd to make fuller inquiries after, and to bring the account in writing.

The lists of the several committees for the improvement of several philosophical subjects being considered, the society thought proper to nominate a chairman for every one of them, and to appoint times and places for their meetings:

The lord BOUNCKER for the mechanical committee, to meet at his lodgings the first and third Saturday of the month, in the morning, about nine of the clock:

Dr. GODDARD for the astronomical and optical committee, to meet at his lodgings in Gresham-College the first and third Monday of the month, in the afternoon about two of the clock:

Dr. ENT for the anatomical committee, to meet at his house the and
Friday of the month, in the afternoon about two of the clock:

Dr. GODDARD for the chemical committee, to meet at his lodgings the second and fourth Saturday of the month, in the afternoon at three of the clock.

Mr. HOWARD for the georgical committee, to meet at his lodgings in Arundel-house the first and third Thursday of the month, in the afternoon at two of the clock:

Dr. MERRET for the committee of collecting histories of trades, to meet at his lodgings in the College of Physicians the and Tuesday^a of the month, in the afternoon at two¹ of the clock:

Mr. HOSKYNs for the committee for collecting philosophical phenomena and experiments, to meet at his lodgings in the Temple the second and third² Thursday of the month, in the afternoon at two of the clock:

Mr. POVEY for the committee of correspondence, to meet at his lodgings in Lincoln's-inn-fields the third Friday of the month, in the afternoon at three of the clock.

June 15. At a meeting of the COUNCIL were present

| | |
|-----------------------------|----------------|
| The lord viscount BOUNCKER, | Mr. BALLE. |
| president. | Dr. WILKINS: |
| Mr. HOWARD. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Mr. HILL. |
| Sir PAUL NEILE. | Mr. COLWALL. |
| Sir PETER WYCHE. | Mr. HOSKYNs. |
| Mr. AERSKINE. | Mr. OLDENBURG. |

^a First and third Tuesday MS. paper of Dr. PELL.

¹ Five, *ibid.*

² Fourth, *ibid.*
Sir

Sir ROBERT MORAY reported, that Mr. Secretary BENNET had acquainted him, that the king had referred the petition of the society concerning the grant of Chelsea-College to the consideration of the archbishop of Canterbury, the lord chancellor, lord privy seal, bishop of London, and lord ASHLEY, or any two of them.

It was ordered, that the lord viscount BOUNCKER, Sir ROBERT MORAY, and Sir PAUL NEILE take farther care of soliciting this affair, and of attending the referees of this petition.

At the meeting of the SOCIETY on the same day,
Mr. THOMAS NEILE was admitted.

Sir ROBERT MORAY presented from Mr. HENRY ROBINSON to the society a piece of rock-salt with two moving blebs in it.

Dr. WILKINS was desired, in a letter to Dr. POPE, to make inquiry after a book of one Signior CESARE, concerning the change of the meridian line, whether it were to be had in Italy.

It was ordered, that Sir ROBERT MORAY, Mr. BALLE, and Mr. HOOKE should meet at a time convenient for them to make an observation concerning the variation of the needle, which was affirmed by Mr. BOND to be then $1^{\circ} 30'$ westward.

Mr. BOYLE mentioned, that it would be worth trial what power intense cold hath upon loadstones, by inclosing some of them in ice in winter.

Mr. HOOKE affirmed, that a loadstone in winter taketh not up so much iron, as in summer.

The experiment of powder in a case of steel, much stronger than before, was again tried, but without any report or other visible effect; which was ascribed to the want of sufficient heat. It was ordered, that the fire be made strong enough at the next meeting for the repeating of the experiment.

A piece of a dog's skin was cut off from the neck, and stitched on again, to see, whether it would grow on again. The operator was charged to have a special care of the dog, that he might not scratch off the patch.

Dr. WILKINS mentioned something of a serpentine-stone brought out of the Indies, which was affirmed to extract poison, and so to cure the bitings of venomous animals, by being applied to the wound, and by sucking out the venom; of which being fatiated it falls off from the wound of itself, to which it before closely adhered, and being thrown into the water raiseth a fermentation therein, and so purgeth itself; whereupon it may be *de novo* applied to draw out more poison till the cure be completed. He alledged, that some body had assured him of an instance of a cure done in England in the manner above mentioned, in a man bitten by a viper.

Mr.

Mr. OLDENBURG seconded this relation, only with this difference, that, according to the account of Dr. MOSSLAER, a German physician residing in London, this stone, to be found in the East Indies, in Pegu (whence one had been sent by Mr. OXENDON, an English gentleman, to his lady, who had presented the said doctor with it, of $\frac{1}{2}$ of an inch diameter, of a greyish colour) purged itself not in water, but in milk; the experiment having been made with such a stone by Mr. WILLIAM MOLINS upon a man bitten with a viper.

It was mentioned by Dr. WILKINS, that the biting of English vipers, especially in the cold and wet seasons of the year, seldom are found mortal.

This was seconded by Dr. BALLE, who added, that in some parts of Italy, as about Padua, there was a great difference amongst vipers, as to their poisonousness; the physicians in those parts choosing the mountain-vipers as very good for their treacle, and rejecting the low-ground ones, as of small virtue, and seldom mortally venomous.

There were made two experiments of breaking wood; the one of them a cylinder of pear-tree wood of $\frac{1}{2}$ of an inch diameter; which, the weight being hung at $1\frac{1}{2}$ inch off was broken transversely with $6\frac{1}{2}$ pounds, the weight of the scale being 5 pounds; in all $11\frac{1}{2}$ pounds; perpendicularly with 183 pounds. The other was with a like cylinder of wainscot broken transversely, with 7 pounds, and the weight of the scale 5 pounds, in all 12 pounds; perpendicularly with 173 pounds.

Mr. HOOKE was put in mind of the experiment proposed formerly by him of rendering wood hard and tough for duration by boiling it in tar.

Mr. HOWARD suggested, that this experiment might be tried upon willows.

The secretary brought in and delivered to Mr. BALLE for Dr. COTTON, and to Dr. CROUNE for Dr. POWER, the paper, that contained the methods of discovering the reason, why the weight of bodies differs above and under ground.

Occasion being given to consider, whether the fulmination of gold-powder proceeds from the salt left in it, or not? Mr. BOYLE suggested, that it might rationally be ascribed to the texture resulting from the combination of the salt with such and such bodies.

Mr. HOOKE proposed, that a certain instrument contrived by him might be made, to try refractions in, whether they hold by sinus's.

June 22. At a meeting of the COUNCIL were present

The lord viscount Brouncker,
president.

Sir ROBERT MORAY.

Sir PAUL NEILE.

Sir ANTHONY MORGAN.

Sir PETER WYCHE.

Mr. AERSKINE.

Dr. GODDARD.

Mr. HILL.

Mr. COLWALL.

Mr. HOSKYNs.

Mr. OLDENBURG.

VOL. I.

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It

It was ordered, that Mr. HILL and Mr. HOSKYNs confer with Sir WILLIAM PETTY and Mr. GRAUNT concerning the manner and form, in which it might be most proper for Sir JOHN CUTLER to put in execution his promise of giving fifty pounds a year to Mr. HOOKE during his life for the reading of the histories of trades in Gresham-College.

It being mentioned, that in case Mr. HOOKE's microscopical observations should be printed by order of the society, they might be perused and examined by some members of the society; the lord viscount Brouncker was desired to undertake this perusal, and to communicate the manuscript, after his perusal of it, to whom of the society he should think fit.

At the meeting of the SOCIETY on the same day,

Dr. PELL was joined to the curators appointed at the preceding meeting for making the observation of the variation of the magnetic needle in White-hall garden.

He mentioned, that he had written a small exercitation upon Mr. GELLIBRAND's *Mathematical discourse upon the variation of the magnetic needle; together with the admirable diminution thereof lately discovered*¹; and he was desired to communicate it to the society.

He intimated, that it was difficult to draw a standing astronomical meridian to compare with a magnetical meridian.

He likewise remarked, that it would be very proper to provide an exceeding good loadstone, to be kept at Trinity-House, for all mariners, who go to sea, to touch their needles upon for an uniform direction.

Mr. COLWALL affirmed, that Mr. BOND had made tables of the variation of the needle, according to his own hypothesis, by him as yet concealed.

The operator reported, that the diver had been under water with the new instrument a pretty good while; but that he wanted some fit glasses for his eyes.

Mr. HOOKE promised to prepare a pair of convenient spectacles for that purpose.

The dog, that had a piece of his skin cut off at the former meeting, being inquired after, and the operator answering, that he had run away, it was ordered, that another should be provided against the next meeting for the like experiment.

It was ordered likewise, that another dog should be provided against the next meeting, to cut out his spleen, without tying up the vessels thereof, according to the suggestion of Dr. CLARKE.

¹ Printed at London 1635, in 4to.

The experiment of the glass-cane filled with water, and a little vial in it, was made with success; the water (as this experiment was ordered, and is set down in the Journal of May 11, 1664) shrinking into less room, and the air expanding itself so as to buoy up the little glass; and an infinite number of small bubbles appearing about the inside of the glass pipe, which, as the water cooled, swelled bigger. It was ordered, that this experiment be repeated at the next meeting.

There were several experiments made of the strength of beech-wood, by breaking several pieces thereof. One, being a quarter of an inch diameter, and an inch and half long, was broken horizontally with twenty-four pounds. Another piece, of half an inch diameter, and three inches long, was broken horizontally with seventy-four pounds. A third piece, of a quarter of an inch diameter, and six inches long, broken horizontally with four pounds seven ounces and half. A fourth, of half an inch diameter, and six inches long, broken horizontally with thirty-seven pounds.

Mr. PACKER mentioned, that the season, wherein wood is cut, and the age of it, and the different soils where it grows, make a great difference in one and the same kind of wood, as to its strength and toughness.

Dr. GODDARD moved, that experiments might be made of several sorts of wood of the same dimensions, both with the grains direct and transverse. It was ordered, that pieces of fir and elm be provided against the next meeting, and broken by weight, both with the grain direct and transverse, to see whether the fir in the transverse position would hold as much as elm.

Sir WILLIAM PETTY intimated, that it seemed by the scarcity and greater rate of knee-timber, that nature did not furnish crooked wood enough for building: wherefore he thought it would be fit to raise by art, so much of it in proportion, as to reduce it to an equal rate with strait timber.

The experiments for the next meeting, besides the above mentioned, were appointed: 1. The choaking and reviving of chickens, by Dr. CROWE. 2. The celerity of falling bodies with Mr. HOOKE's new instrument, to be tried from Mr. WILSON's room. 3. To cut the steel case, wherein the powder-experiment was formerly tried in a good fire without any report, to see what is become of the powder.

It was ordered, that the instrument proposed by Mr. HOOKE for measuring refractions, should be used with all speed.

June 29. At a meeting of the COUNCIL were present,

The lord viscount Brouncker,
president.

Sir ROBERT MORAY.

Sir PAUL NEILE.

Sir PETER WYCHE.

Mr. AERSKINE.

Dr. GODDARD.

Mr. HILL.

Mr. HOSKYNs.

Mr. OLDENBURG.

L 11 2

Mr.

Mr. SUTCLIFFE soliciting the payment of the ninety pounds remaining, was desired to have patience till the attorney-general had made a report concerning the king's power of granting Chelsea-college, and the land belonging to it.

Sir ROBERT MORAY reported, that the attorney-general had appointed the Saturday following, to give a report concerning Chelsea-college.

At the meeting of the Society on the same day,

Dr. WILLIS caused his book *De Anatomie Cerebri* to be presented to the Society by the hands of Dr. BATHURST; by whom also he excused himself for not having presented it sooner, as also for not having owned himself a member of the Society in his book, alledging his want of confidence for the one, and that of an example for the other. The Society desired Dr. BATHURST to return their thanks to Dr. WILLIS, both for the present, and for the civility of his excuse; and ordered, that Dr. CHARLETON's discourse concerning the difference between the brain of man and the brains of other animals, should be communicated to Dr. WILLIS by the care of Dr. BATHURST.

Dr. CROUNE tried again his experiment of choaking and reviving a chicken, but without success. There were taken two chickens, and both, by compression with his fingers, choaked together in three minutes ten seconds; and one of them laid by, to see whether it would recover without art. The other was blown into by a small pipe through the larynx into the lungs; but neither of them recovered. Dr. CROUNE was desired to make this trial several times privately, to be the more ready in making it before the Society.

Sir ROBERT MORAY produced a glass with dead cantharides in it, that had been there so for the space of three years, the mouth of the glass having been covered with a paper; but there appeared in it some small living flies, supposed to be generated from the dead cantharides. It was recommended to Mr. HOOKE, to look upon the flies with a microscope.

Dr. GODDARD moved, that Mr. HOOKE might be desired to view a viper's tooth in a microscope, and to give an account of the observation to the Society.

Sir ROBERT MORAY produced an odd kind of plant, said to have grown at the bottom of a pond, and having strings, that for a certain space run pretty evenly distant from one another, but then meet in knots.

The operator produced the case of steel, with the gunpowder, opened, some of which gunpowder being taken out, and held on a piece of paper over the fire, gave no report at all, but flamed away without any noise; it being found calcined in the cavity, and turned into an alkali; and growing moist in the air, the nitrous part having been destroyed by some vent or other, without cracking the case made extraordinarily strong.

It was ordered, that the like experiment should be repeated, both with prince RUPERT's and the fulminating powder, at the next meeting.

The dog, which had a piece of his skin cut off, being run away, it was ordered, that Dr. WILKINS and Dr. CHARLETON should repeat the experiment by themselves, to have the better care of the dog.

Sir ROBERT MORAY moved, that the experiment of calcining antimony by the sun, and thereby increasing it by weight, according to the assertion of some chemists, might be made. And it was ordered, that Dr. GODDARD be desired to be curator of this experiment.

Mr. SOUTHWELL mentioned the art of pilchard-fishing in Ireland and other parts; and was desired to procure the whole history of it.

Sir ROBERT MORAY moving, that the like history of herring-fishing might be thought on, Mr. EVELYN observed, that one Mr. SMITH had published a good discourse upon that subject, containing all that was material in that practice.

Mr. HAAK mentioning a way of ordering ling, so as to make it white, and yet eat very well, he was desired to procure the account of it.

He intimating, that he had a friend in Helvetia, by whose means he could get some of the strong perry made in that country, was desired to procure some, together with the method of making and keeping it.

There were made several experiments more of breaking wood :

1. A piece of fir, of half an inch diameter, and three inches long, at which distance the weight hung, broke in the plain of the grain horizontally with sixty-pounds three quarters, whereof fifteen pounds Troy; vertically with two pounds more.
2. Fir, of a quarter of an inch diameter, and an inch and half long, broke vertically with twenty pounds, and horizontally with nineteen pounds.
3. Elm, of half an inch diameter, and three inches long, broken horizontally with forty-seven pounds, vertically with twenty-three pounds.
4. Elm, of a quarter of an inch diameter, and an inch and half long, broke horizontally with twelve pounds, vertically with ten pounds.

Sir EDWARD HARLEY moved, that the difference between cleft and sawed wood might be tried this way.

Sir ROBERT MORAY moved, that it might be examined, what truth there is in that received tradition, that the stainings of fruit will not wash out the same year that they are made, but will the next spring, at the time of their blossoming; after which is past, they cannot then be washed out that year. Dr. CROUNE was

was desired to be curator of this kind of experiments, by staining linnen with all sorts of staining fruit, berries, wine, &c.

Mr. HOSKYNs related, for the improvement of metals, that one WETHALL had raised a great estate from the mines of Mendip, by melting the ore after a particular manner, for the extracting much more metal out of the ore than ordinarily is done. He was desired to inquire farther after it.

The experiments appointed for the next day were those of the celerity of falling bodies, and of the fulminating powder, or prince RUPERT's powder, in the cylinder of steel; and of breaking more kinds of wood.

Mr. HOOKE was desired to think upon one or two experiments more for that meeting.

July 6. At the meeting of the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Mr. PALMER. |
| Mr. HOWARD. | Mr. COLWALL. |
| Sir ROBERT MORAY. | Mr. HILL. |
| Sir PETER WYCHE. | Mr. HOSKYNs. |
| Mr. AERSKINE. | Mr. OLDENBURG. |

Dr. GODDARD and Mr. PALMER were put in mind to confer with Mr. ELLISE concerning the statutes of the Society.

Sir ROBERT MORAY mentioned, that the attorney-general had not yet given his report concerning Chelsea-college.

It was ordered, that the COUNCIL should not meet for the future, except upon summons to be sent by the president to every member of the Council.

At the meeting of the SOCIETY on the same day,

An experiment was made to measure the velocity of a sounding string, or to determine how quick the vibrations thereof are in a certain space of time. There was taken a brass wire of 136 foot long, of $\frac{1}{4}$ of an inch diameter; and weighing this string, extended by a weight of $3\frac{1}{2}$ lb. + 1 lb. 10 ounces, and being made to vibrate in the middle, its vibrations were found to be half seconds. Then being stopped in the middle, and the half of that made to vibrate in the middle, was found twice as swift, or to vibrate quarter seconds: whence the length and vibrations appeared reciprocal. And by measuring how much the line bent below a strait line, it was found, that the distance was equal to the length of a pendulum, vibrating equal times with the string; reckoning that length from the strait line with the center of gravity of the parabolical string. Then farther stopping the wire within one foot of the end, and striking that short part, it was guessed to give a note of *G. Sol. Re. Ut*; which was to be experimented by a pipe at the next meeting.

meeting. So that it seemed, that the velocity of the vibration of a string tuned to *G. Sol. Re Ut.* is two hundred seventy-two times in a second.

This experiment, to shew how quick the vibrations must be to give a certain sound, being made, it was tried with the same string, with what velocity a sound is propagated; and it was found, that there is no perceptible interval of time betwixt the stroke at one end of the string, and the hearing the sound at the other end. It was ordered, that the string should be lengthened, for the prosecuting of this experiment.

The observation of the variation of the needle was ordered to be made on the first fair day after Thursday, in Whitehall-garden, at two in the afternoon, meeting at Sir ROBERT MORAY's lodgings.

Mr. HOWARD produced a plant, which he took to be the *Serpentaria Virginiana*, the antidote against rattle-snakes; but Dr. MERRET judged it to be faxifrage, as having the perfect taste and smell thereof.

Capt. SILAS TAYLOR related, that the Virginians, when they would kill rattle-snakes, take the plant called ditany of Virginia, and having tied some of it between a cleft stick, hold it to the snake to smell; who presently coils herself up, keeping her head in the middle, and turning it away from the plant as much and as long as she can: then after some few moments of time, she opens herself on a sudden, and being stretched out in length is found quite dead. This relation he affirmed to have received from one Mr. GREEN, a very credible person, from whom, and from others, if it might be, Capt. TAYLOR was desired to procure this story under their hands, which he promised to endeavour to do.

Sir ROBERT MORAY produced a small stone, in part of a bloody colour, given him by the lord privy-seal¹, and by him said to be taken out of the walls of a church standing upon the sea at Pendennis, after the top and walls of that church, by thunder and lightning, were turned into this ruddy colour.

The experiments of breaking wood were prosecuted:

A piece of oak, of half an inch diameter, and three inches long, brake horizontally with forty eight pounds, vertically with forty-six pounds.

Ash, of half an inch diameter, and three inches long, horizontally with seventy-seven pounds, vertically with seventy-five pounds.

Ash, of a quarter of an inch diameter, and an inch and half long, horizontally with nineteen pounds, vertically with twenty-three pounds.

Oak, of a quarter of an inch diameter, and an inch and half long, horizontally with fifteen pounds, vertically with twelve pounds.

It was ordered, to try the best part of oak, and likewise Dr. GODDARD's comparative way of breaking fir and elm, both direct and transverse grains.

¹ JOHN lord ROBERTS.

Capt.

Capt. TAYLOR related, that he had known a Frenchman, who had a secret of tempering and hardening iron so that it would not rust, either by sea-water, or vinegar, or urine; adding, that the steel of a gun, which he produced, had been put in salt water, and was not affected with any rust; and that the same gun had not been oiled since it had been made, viz. for three years, having been in the magazine of Dunkirk, where it had kept free from rust, when all other arms grew rusty very often. He added farther, that the artist employed a certain water, which he concealed the ingredients of, wherein he quenched the iron eight or ten times, in order to reduce it to this condition.

Dr. BALLE related, that in Exeter river there was found a kind of very black and heavy oak, which had lain there for several hundreds of years, cut down formerly to make the said river usefulefs to that city. He was desir'd to fend for some of this wood, and for some of the ordinary oak of that country, to try and compare their strength.

Sir ROBERT MORAY moved, that the wood of Hatfield-chace in Yorkshire, having been buried there by a deluge, and the place afterwards drained, it might be inquired, what was become of that wood, and how it was altered by lying thus long under-ground. Dr. CHARLETON remarking, that Mr. DUGDALE having given a good account of this place in his *History of imbanking and draining of divers fens and marshes, both in foreign parts and in this kingdom*, the amanuensis was ordered to borrow that book of Mr. MARTYN, for the use of the Society, against the next meeting.

Mr. HOOKE being called upon to give an account of the flies found alive in the glass with the dead cantharides, produced at the preceding meeting, said, that having looked upon them with a microscope, he found them to be not young cantharides, but ordinary flies.

Sir ROBERT MORAY mentioned, that Mr. THOMAS KILLEGREW had assured him, that he had found a pot with viper-powder in it, brought from Venice, and closely stopp'd, full of little live insects after the space of six months.

Dr. PELL added, that he had known a chemist, who used to perfume his viper-powder with myrrh, to preserve it from breeding worms.

Mr. EVELYN gave an account, how that the flesh, which he had formerly, by order of the Society, put up in a glass, covered with double flannel, had bred no live creatures, but turned into a mucilage, and then dried up.

The experiment of common powder in the steel case was tried again in a strong fire; but no report was heard except only a little hissing, nor any crack found in the vessel.

Sir ROBERT MORAY was desired to procure some of prince RUPERT's powder; and Mr. HOOKE to bring some of his fulminating powder, to be tried in the steel case at the next meeting.

It was ordered, that the skin of a dog be cut off in Dr. WILKINS's house, after his return; and that Dr. CHARLETON perform the operation.

Mr. HOSKYNs desired, that some physicians, upon occasion, might be appointed to examine the truth of what KIRCHER affirmed, that little worms were found in the blood of pestiferous persons.

Dr. MERRET related, that Dr. HARVEY had sometimes found the blood full of worms in malignant fevers.

Mr. EVELYN seconded this relation, by affirming, that Mademoiselle D'ORLEANS being sick of a fever, a vein being opened, her blood was full of little worms; Dr. DAVISON assuring him, that himself and several other physicians had seen it.

Dr. PELL mentioned, that VAN HELMONT had taken notice, that the stomachs of persons dying of pestilential or other malignant fevers had holes in them. Which was seconded by Dr. MERRET, who added, that such stomachs were found gangrened, having had violent vomitings preceding.

The experiments appointed for the next meeting were; 1. To prosecute the trials with the brass wire. 2. To try the velocity of falling bodies with Mr. HOOKE's new instrument. 3. To prosecute the breaking of wood. 4. The anatomical experiment, by Dr. GODDARD. 5. Mr. HOOKE's experiment with a glass-cane and glass bubbles in it.

July 13. The experiment of determining the velocity of the vibrations of a brass wire, to afford a certain sound, was prosecuted, and agreeing with what was made at the last meeting, order was given, that a monochord should be prepared against the next meeting, to know the diversity of notes by.

The experiment of the velocity of a sound's being propagated was likewise repeated, and prosecuted by lengthening the wire to 272 feet; and it was found as before.

The experiment of measuring the celerity of falling bodies was tried; but the wind disordering the string, on which the ball hung, it was referred to the next meeting; order being given to prepare a board for the balls to fall upon without a string; as also to try, besides balls of lead, other bodies of the same magnitude and figure.

Sir ROBERT MORAY made some report of the observation of the variation of the needle, viz. that much uncertainty was found in it, the needle standing one time between 1° and one $1^{\circ} 30'$ westward, another time about $1^{\circ} 30'$ eastward;

Vol. I.

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but at last directly north and south. It was ordered to repeat the observations as often as conveniently might be, and that Mr. HOOKE should bring in writing the whole apparatus and all the circumstances of the observations.

Sir ROBERT MORAY moved, that those two magnetical experiments might be made, 1. Whether a needle might be so touched upon any magnet, as not to point to the true north or south. 2. Whether different loadstones would give different directions; and whether fainter or stronger touches upon one and the same stone would cause any variation in the directions. It was ordered, that for this purpose as many loadstones, as could be had, should be gotten, and a good number of needles exactly made of the same metal, bigness, and figure.

Sir ROBERT MORAY moved likewise, that a magnet being found not to have so much virtue, when whole, as when broken into several pieces, an experiment might be made of breaking a loadstone into many pieces, and comparing the aggregate of the weights lifted up by all the several pieces to the weight lifted up by the intire stone. It was ordered, that Mr. BALLE have the care of making these experiments.

It was suggested by the president, that the cause of this phenomenon might be the largeness of the surface in such broken pieces exceeding that of the whole.

Mr. HOOKE mentioned, that he had seen a little loadstone lift up 150 times its weight.

The experiment of firing gun-powder in a steel-cask was tried again; but no report was heard, nor any thing broken in the vessel.

Sir PAUL NEILE moved, that it being probable, that the gunpowder might melt in the cask by the gradual heat of the fire, and so make no report, a hole might be drilled in the screw, and by that means the powder fired with a brimstone thread.

Mr. HOOKE moved, that the experiment might be made with fulminating powder.

It was ordered, that both these experiments should be made, and that it should likewise be tried, whether *aurum fulminans* and *pulvis fulminans* give a flame, when fired.

Mr. DUGDALE'S *History of imbanking and draining of divers fens and marshes* being produced, according to the order of the last meeting, and the place, for which it was produced, being read, it appeared from thence, that that fenny tract called the *Isle of Axholme*, lying part in Lincolnshire and part in Yorkshire, extending as far as Hatfield Chase, had antiently been a woody country, as was evident from the abundance of oak, fir, and other trees, of late frequently found in the moor; whereof some oaks were five yards in compass, and sixteen yards long; others smaller and longer; with good quantities of acorns near them, lying somewhat above

above three feet in depth, and near their roots, which still stood as they grew, viz. in firm earth below the moor. The firs lay a foot or eighteen inches deeper, more in number, and many of them thirty yards long, one of them having been not many years before taken up of thirty-six yards long, besides the top, lying also near the root, which stood likewise as it grew, having been burnt, and not cut down, as the oak had also been. The number of those trees was represented by Mr. DUGDALE as so great, that the inhabitants had for divers years past taken up 2000 cart-loads in a year. Of the first time of the overflowing of this woody level Mr. DUGDALE could give no account; only that it had been so for divers hundred years, as, he observed, the depth of the moor evinced, which could not in a few ages grow to that thickness, which it was of. With regard to the cause of it, he concluded it to have been the muddiness of the constant tides, which flowing up the Humber into the Trent, left in time so much filth as to obstruct the currents of the Idle, Dune, and other rivers, which thence flowed back, and overwhelmed that flat country.

July 20. Mr. BOYLE produced several kinds of iron ore out of one and the same mine, of which there was one sort, that was particularly taken notice of for its looking not at all like ore, and yet being found, as Mr. BOYLE affirmed, the best of iron ore.

The experiment of dividing the brass wire, to give musical notes with a monochord, was made as follows: The brass wires were extended upon a long square box of four feet long, one with a weight, the other with a pin, till they became unisons. Then the one being stopt in the middle with a moveable bridge, the two halves on either side were unisons to one another, and one of them an eighth higher than the other, which was not stopt. The same was again divided with a bridge, so that the part on one side to that of the other was as one to two, and the shorter was an eighth higher than the longer, and the longer a fifth higher than the whole string. Then the same was again so stopt, that the part on one side to that on the other was as one to four, and the second was a double eighth higher, which is a fifteenth.

It was ordered, that this experiment be prosecuted at the next meeting by adding weights, to shew, what proportion weights have to sounds.

Mr. BALLE produced several loadstones, and amongst them two terrella's, whereof one seemed to have four poles, with a circle passing between them, of no virtue at all. Some of the society suggested, that it was probable, that this stone consisted of two stones by nature cemented together by a piece, which had no magnetical quality in it. The other terrella was bored in the middle for an iron pin to pass through; wherein it was observed, that the iron pin being in it, the needle applied pointed not to the pole, but at some distance round about it; but the said pin being taken out, the needle pointed just into the middle of the polar hole. Mr. BALLE being asked, whether he had found, that these terrella's, by the roundness of their figures, had acquired more virtue than they had in other figures, answered in the negative.

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It was ordered, that the former of these terrellas be armed on all the four poles, and then produced again before the society.

Mr. BOYLE produced a book containing a relation of Iceland by Monsieur PEYRERE, a Frenchman; and was desired to lend it to the secretary to peruse it, and to give an account of it to the society.

Dr. GODDARD gave an account of calcining antimony in the sun with a burning-glass, viz. that he had found it so far from increasing its weight, that the weight was decreased from twelve grains to between three and four.

Mr. BOYLE affirmed, that he had the like success in such an experiment; but that Monsieur LE FEBURE, who asserted the increase of antimony calcined by the sun, hearing of the want of such success with him, answered, that it had not been calcined enough to reduce it to a fixed salt fit for the imbibing of air.

The operator produced some of the powder, that had been heated in the steel-case, and affirmed, that he had dried it, and carried it for some time in his pocket, where it was become moist.

Mr. BOYLE suggested, that the warm and moist steams issuing out of the operator's body, and transpiring into the powder in his pocket, might probably be the cause of the moistness.

Capt. TAYLOR produced an account in writing of the manner, related by him at the preceding meeting, of killing rattle-snakes by the *Serpentaria Virginiana*, attested by two eye-witnesses: which was ordered to be registered*.

He affirmed, that the water of this herb, taken inwardly by those who were bitten by rattle-snakes, cured them perfectly.

Mr. BOYLE related some experiments made by himself with Tunbridge water, to find, whether the virtue of it was easily to be lost, viz. that he had taken some fresh oak-leaves, torn them, and put them into some of that water, which thereby turned into a violet-colour in two minutes: but having kept some of that water for two or three days in a bottle stoppt carelessly, and put in likewise some of the above-mentioned leaves, he found no change in the colour at all.

Having made also an experiment of the weight of the said water, he affirmed, that he found the difference of its weight from that of common water inconsiderable.

Notice being given, that some ships were ready for Guinea, it was desired, that such, as had inquiries to be made in those parts, might prepare them against the next meeting.

* Original Register, vol. iii. p. 59. It is printed in the Philos. Transf. n° iii p. 43.

The experiments ordered for the next meeting were,

1. That of the celerity of descending bodies.
2. The prosecution of the experiment of brass-wire to find out musical notes.
3. Of breaking fir and elm.
4. Of measuring refractions by Mr. Hooke's new instrument.
5. Of firing both gunpowder and fulminating powder.
6. Of trying, whether *aurum fulminans* and *putris fulminans* will flame, when fired.

July 27. At the meeting of the COUNCIL were present

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| The lord viscount Brouncker, | Mr. Aerskine. |
| president. | Dr. Wilkins. |
| Sir Robert Moray. | Dr. Goddard. |
| Sir Paul Neile. | Mr. Palmer. |
| Mr. Boyle. | Mr. Colwall. |
| Sir Peter Wyche. | Mr. Oldenburg. |

The president having moved, that it being probable, that the society would get Chelsea College, Mr. SUTCLIFFE might be furnished with ten pounds more, in consideration of his necessitous condition; it was ordered, that the said sum be paid to him by the treasurer upon his acquittance.

It was resolved, that seeing Dr. WILKINSON was ready to make a resignation of his pretensions to Chelsea College, that the said resignation should be taken upon the terms insisted upon by him, *viz.* of his enjoying thirty pounds *per annum*. or something equivalent to it, during his life, if it could not be obtained upon better terms.

It was ordered, that some persons, who had been intrusted with the management of the business of the said College, continue their care of the same, and take in the assistance of Mr. SMITH:

That at the first opportunity Mr. Hooke be put to the scrutiny for the place of curator:

That he should receive eighty pounds *per annum*. as curator to the society by subscriptions of particular members, or otherwise:

That he forthwith provide himself of a lodging in or near Gresham-College*: And

That these orders and votes be kept secret, till Sir JOHN CUTLER shall have established Mr. Hooke as professor of the histories of trades.

* Mr. Hooke accordingly settled in Gresham-College about the end of August or beginning of September 1664; for in a letter to Mr. BOYLE dated October 6, printed in Mr. BOYLE's Works, vol. v. p. 537. he takes notice, that he had been *full five weeks* settled there.

Mr.

Mr. PALMER reported, that Mr. ELLISE having been consulted with concerning the statutes of the society, had declared to Dr. GODDARD and himself, that they were such both as to matter and form, that he found no exceptions at all against them, but must highly approve of them for the reason, convenience, and perspicuity therein; wishing, that all other laws might equal them in these qualifications.

At the meeting of the SOCIETY on the same day,

The wooden case, containing the East-India present, sent from Sir PHILIBERTO VERNATTI by Sir ROBERT MORAY's procurement to the society, was opened, and the particulars produced, according to the list accompanying them. The answers likewise returned by Sir PHILIBERTO to certain inquiries formerly sent thither by the society, and recommended by Sir ROBERT MORAY, were read, and ordered to be registered*. Sir ROBERT MORAY was also desired to write a letter of thanks for this double present, and to take care, that an order be drawn up for moving the East-India company, by the favour of the lord BERKLEY, that they would please to recommend such kind of inquiries to their correspondents in the East-Indies, and take care of the conveyance of what should be committed to them for the society.

It was ordered, that the said answers to the inquiries being registered, should be communicated to such members of the society, as were willing to take occasion from thence to press for more particular answers upon these inquiries; such, for instance, as, how the oil drawn out of the roots of a cinnamon-tree, and resembling camphire, is extracted from thence? and what the birds are, which make the Cochinchina nests, and of what materials they make them, &c.

It was likewise ordered, that new inquiries be brought in by those, who could think on any, for the East-Indies: And

That Mr. BOYLE and Mr. HILL bring in their inquiries for Guinea against the next meeting.

Mr. BOYLE mentioned, that there was in England a plant somewhat like the *arbor tristis* of the East-Indies, which blows about sun set, and sheds its blossoms in the morning, as soon as the weather grows to any degree warm.

He remarked likewise, that the yew-tree was mischievous to horses, there having been three horses tied to such a tree at the Wells, which eating of its leaves, two of them died within a few hours after, and the third recovered with much difficulty, after the use of several remedies.

This was seconded by Dr. WALLIS, who affirmed, that the leaves of the said tree being mingled with meat, and given to dogs, would certainly kill them.

* Original Register, vol. iii. p. 44. These answers are printed in SPRAT's History of the Royal Society, p. 158.

Reflexion being made upon the wood, said in the East-Indian account to smell like human excrement, it was remarked by Dr. CROUNE, that RIVIERUS in his Observations mentioned, that in the time of a great plague at Montpellier, there were three persons in one and the same house cured of that infection by giving themselves a vomit made of their own dung and urine.

Mr. PALMER seconded this with a story of the like cures performed at Genoa by the like remedy in as many persons as made use of it.

Mr. BOYLE acquainted the society, that he had caused to be made a true measure of a cubic inch of water, thereby to estimate the bigness of bodies. He was desir'd to communicate to the society the performances, which he should make with it.

The experiment of firing prince RUPERT's powder in a case of steel was made. It was very closely screwed up, and a very small hole drilled in the side of it, thro' which, by the means of a train of touch-powder, fire was given to the included powder, which immediately discharged with a great noise and violence, and threw the case about four or five feet from the place where it lay, but did not break any part of it, nor widen the little hole, which was no bigger than to receive a small pin. Yet upon examination of the whole, after the discharging of the powder, the little hole was found somewhat bigger than the drill, by which the operator affirm'd he had made the same.

The experiment with *pulvis fulminans* was likewise made. A quantity of it was included in another steel case, and then set on fire, which after some time upon going off gave a dull hollow noise; but it neither broke the case, nor was there any appearance of flame or smoke.

Mr. BOYLE propos'd, that it might be examined, what is really the expansion of gunpowder, when fired.

The experiment with the monochord was prosecuted, and one wire being extended by five pounds weight, the other was tuned to an unison with it; and then the same string being stretched with a weight of twenty pounds, it was found just an octave higher: which shews, that the weight is in a duplicate proportion to the sound or vibration.

It was order'd, that this experiment be farther prosecuted at the next meeting; as also that of the celerity of falling bodies; and that *aurum fulminans* and *pulvis fulminans* be fired in a dark corner, to see, whether they would flame; and that the instrument for measuring refractions be prepar'd.

August 3. JAMES HOARE, esq; was propos'd candidate by Mr. SLINGSBY.

The experiment of the velocity of descending bodies was tried with three leaden balls of different sizes; the diameter of one being $1\frac{1}{16}$ inch; of the second, $1\frac{1}{8}$ inch;

inch; of the third, $\frac{7}{8}$ inch. The height of their descent was sixty-one feet; the time three vibrations of half seconds and $15''$ or $16''$. So that the difference between them was but $1''$.

Mr. HOOKE was desired to find some convenient place in Westminster or Paul's for the prosecution of these experiments in a place free from wind; and to request such persons of the society for his assistance, as he could get.

The experiment of the monochord was prosecuted. Two strings being tuned unisons, one of them was stopt at one third, and the lower end of it gave a fifth, and the shorter end was an eighth higher than the longer. Then one of the strings was so stopt, as to make it a note higher than the whole; and the proportion of the shorter to the whole was found less than 9 to 10. Then the string was stopt a third higher, and the proportion was found as 3 to 4. This was estimated so by the ear.

Capt. TAYLOR was desired to speak to Mr. BIRCHENSHA to be present at the next meeting for the prosecution of these experiments.

The experiment of breaking fir and elm was made, and a piece of fir of one inch diameter at six inches distance from the weight was, with the grain transverse, broken horizontally with fifteen pounds; vertically with twenty-three pounds. Elm of the like dimension at the like distance, with the grain transverse, broken horizontally with thirty-two pounds at most; vertically with thirty-three pounds.

The operator gave an account, that the *pulvis fulminans* kept in the steel-case a whole week did, as soon as it had any vent by making the screw a little easy, give a strong blast and a smoke. Fresh powder being taken, and put upon an iron-plate over some coals, fired after a little while, with a very smart report.

This experiment with the *pulvis fulminans* was ordered to be repeated at the next meeting.

The president produced from Sir WILLIAM CURTIUS a hairy ball found in the belly of a cow.

Mr. OLDENBURG produced some ores and mineral earths sent to him from Germany, to the number of seventeen particulars, which he desired to leave in the repository of the society, who accepted of them.

Mr. HILL's queries for Guinea were read, and Dr. WILKINS was desired to deduce others out of them, and to add more.

It was ordered, that the committee for correspondence consider of drawing up both general and particular heads of inquiries for all the parts of the world.

Dr. WILKINS brought from Dr. WORTHINGTON a bundle of letters written by Mr. HORROX to Mr. CRABTREE concerning astronomical matters. It was ordered, that

that the secretary send them to Dr. WALLIS to peruse them, and extract out of them what he should think fit to be digested and published with the other written pieces, which he had already in his hands, of the same author.

The order for recommending inquiries to the East-Indies was brought in by the secretary, and approved of, as follows :

Ordered, That Dr. WILKINS be desired to speak to the lord BERKLEY, that he would please, in the name of the Royal Society, to move the committee of the company for the East-Indies, that, by their interest in these parts, they would procure such answers, as may satisfy the inquiries to be sent to them ; as also such particulars of the productions and curiosities of nature, as shall be specified unto them, and such others, as those parts do afford, and they by their industry can inquire, for the use of the said society. Moreover, to write to their correspondents at Bantam, to take a special care of the transport of such things, as shall be transmitted and recommended to them by Sir PHILIBERTO VERNATTI for the use of the said society, and to pay there what may be demanded for them : which expences the said society will be careful to repay upon demand.

The experiments appointed for the next meeting were, 1. The prosecution of sounds with the monichord. 2. The measuring of refractions. 3. The descent of bodies. 4. The *pulvis fulminans*.

August 10. At the meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. MERRET. |
| Sir PETER WYCHE. | Mr. OLDENBURG. |
| Mr. AERSKINE. | |

The form of the king's and the duke of York's subscriptions was referred to the committee, that met on Mondays at Dr. GODDARD's lodgings.

At the meeting of the SOCIETY on the same day,

The secretary presented the society from Mr. BEAL with a box full of several sorts of stones, by which the latter conceived it might be seen what is the process of the plastic spirit in shaping perfect cockles, muscles, scollops, headless serpents, fishes, thunder-stones, &c. But several members were of opinion, that these shells had been filled with clay or mud, which from them received the impression of their figure, and was in length of time hardened into a stony substance; seeing that in some of these stones the shells were yet manifestly distinct from the petrified earth, though in others both earth and shell had been converted into stone together. There was begun to be read Mr. BEAL's annexed discourse relating to these stones, the rest being referred to another meeting, because Mr. BIRCHINSHA was without, expecting to be called in, for the prosecution of the experiments with the monochord, according to the order of the preceding meeting.

VOL. I.

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Mr.

Mr. BIRCHINSHA being accordingly called in, tuned the string by his ear, to find how near the practice of music agreed with the theory of proportions. The effect was, that he could not by his ear distinguish any difference of sounds (upon the moving of the bridge) above half an inch, especially in the fourths, thirds, and tones. Whereupon it was resolved, that a virginal should be as exactly tuned, as could be done by the ear, and then the monochord examined by it.

Mr. POVEY being desired to name a day for the committee of correspondence to meet, moved the third Friday of every month, about three of the clock in the afternoon, at his house in Lincoln's-inn-fields.

He was requested to procure for the society a collection of all sorts of curious woods, minerals, and petrified substances; which he promised to do.

He likewise offered to bring in from his brother lately come from Jamaica, and admitted to be present at this meeting, several sorts of shells found in mines with minerals in them.

Dr. GODDARD moved, that among the inquiries *de novo* to be sent to the East-Indies, it might be carefully inquired after, whether that wood, which lately came from thence, having the smell of human excrement, did really grow so.

He and Dr. MERRET were desired to bring in a list, of what other particulars of natural things, supposed to be in the East-Indies, inquiry should be farther made.

Mr. POVEY was desired to consider how woods might be improved for dying.

It was ordered, that the way of fixing colours should be recommended to Mr. HOWARD, Mr. BOYLE, and Dr. MERRET. And that the gun, which Mr. PALMER gave to the society, should be lent to Dr. CHARLETON for a month.

Dr. CHARLETON informed the society, that he had a way of keeping a gun from rusting for a year by cleansing it with oil, whence the salt was separated; which, he said, might easily be done by boiling the oil in warm water; whereupon the salt would part from it: and if then the touch-hole was stoppt with a quill, and the other holes with cork, and the gun kept in a case, it would not easily rust.

Sir ROBERT MORAY acquainted the society with a letter of Monsieur HUYGENS, written to himself, containing philosophical matters; which was ordered to be read at the next meeting.

Mr. PACKER brought in the account of mine-damps, which was also ordered to be read at the next meeting.

The experiments appointed for the next meeting were,

1. Measuring of refractions.

2. Velocity

2. Velocity of falling bodies.

3. The flaming of *aurum fulminans* and *pulvis fulminans*.

Mr. Hooke was desired to bring a list of experiments to be made before the society on their meeting-days.

August 17. The engine to measure refractions was produced, examined, and approved of, and Mr. Hooke, the inventor of it, appointed to begin at the next meeting to try experiments in it; as also to give a description of this engine, to be kept in the Register-book.

Dr. GODDARD brought in writing some observations upon the experiments formerly made of several liquors in a tube of about thirty-six feet in length, erected perpendicularly: which was ordered to be registered⁴, as follow:

“ Being filled with simple water, closed near the upper end, and opened below, half a minute after, in the fourth repetition of the experiment, the water settled within the glass-tube at 33 feet $3\frac{1}{2}$ inches perpendicularly from the level of the water in the vessel wherein the lower end of the tube was immerfed.

“ Trial was made in two other liquors, the one lighter the other heavier than simple water; spirit of wine and brine, or simple water impregnated with as much salt as it would dissolve; which in the same measure we found differing in weight, as followeth:

| | | | | | | | | |
|-----------------|---|--------------------|---|---|---|----|----|----|
| “ The weight of | { | the spirit of wine | - | - | - | 8 | 8 | 0 |
| | | the simple water | - | - | - | 8 | 15 | 15 |
| | | the brine | - | - | - | 10 | 0 | 15 |

“ The tube being filled with spirit of wine, stopped above and opened below about half a minute after, the liquor settled about thirteen or fourteen inches higher than the mark of the water. And this experiment being repeated three or four times, there was little sensible difference in the height.

“ Being filled with brine, the liquor descended suddenly above two foot below the mark of the water, and soon after below any part of the glass-tube; how far, could not be judged, because it was out of sight.”

Dr. GODDARD was desired to describe his instrument with strings and pullies intended for a hygroscope, and to take notice of the usefulness thereof, as it had been hitherto contrived, and to think upon another way fitter for success.

A paper of Mr. PACKER's concerning damps in mines was read, and ordered to be filed up; and he was desired to inquire of the person, who had sent him this account, how many shafts there are in that mine, wherein the paper mentioned a great

⁴ Original Register, vol. iii. p. 60.

and fiercely burning coal-fire to have been extinguished in the pit's mouth, when it had drawn the damp up the shaft.

Monsieur HUYGENS's letter to Sir ROBERT MORAY was read, dated at the Hague August 8, 1664, N. S. containing several philosophical matters; as of his new pendulum watch, which might probably serve for the observation of longitude: of his reflections upon the society's experiments concerning the velocity of brags-wires, and upon those, that rise on the division of a monochord: of those made by Mr. HOOKE's instrument for measuring the descent of falling bodies: of the magnet with four poles, Dr. WILLIS's *Anatome Cerebri*, a new chariot, and a telescope of sixty feet.

Sir ROBERT MORAY moved, that for the trial of the vibrations of hard bodies sounding, there might be made a flat round plate of bell-metal, with a hole drilled in the middle, through which a cord might be drawn to hang it by; and to have several of these round plates made of different sizes, to see, what difference of sounds they would make, their edges being struck upon.

Capt. TAYLOR offered from Mr. BIRCHENSHA the fitting of a double bass-viol with gut-strings in such a manner, that being divided they should serve better to distinguish the musical notes by the ear than the wire-strings do. The offer was accepted, and Mr. BIRCHENSHA was desired by Capt. TAYLOR to be curator of the experiment.

Sir ROBERT MORAY moved, that a loadstone, the poles of which were known, might be cut into a crooked figure, to see what it would produce in the poles. This was referred to the mechanical committee.

Mr. HOOKE made report, that a leaden ball descending fell in the first second of time of fall $15\frac{1}{2}$ feet, being tried by him several times; and that the descent holds in a duplicate proportion. It was ordered, that this experiment should be carefully prosecuted by him with balls of several sizes and different materials, and in particular with bodies of a cylindrical figure.

It was ordered, that the experiments of breaking several sorts of wood be prosecuted by Mr. HOOKE; and that they should be made upon the same kinds of wood of several ages, grown in several places, and cut at different seasons of the year:

Mr. WYLDE was desired to shew the society an experiment of his way of softening steel without fire, and hardening it again; which he promised to do, and to give the process of performing it.

The experiments appointed for the next meeting were,

1. Of refractions.
2. Of the velocity of bodies shot by guns or bows.

Letter-book, vol. i. p. 178.

3. Of

3. Of firing *aurum fulminans* and *pulvis fulminans* in a darkened room, to see, whether they flame.

August 24. There was made an experiment for finding the velocity of a bullet by means of the instrument for measuring the time of falling bodies; which was so contrived, that the pendulum was set on moving by the bullet's passing out of the mouth of the carabin, and a board was put up for a mark at a determinate distance, and a string extended from that board to the pendulum, which was fixed just by the gun. It was thought, that by means of that string, which was stretcht pretty stiff, and so contrived, that a small thrust against the board would stop the pendulum, the impulse of the bullet against that board would be presently communicated back to the pendulum, by which means that vibrating body being stoppt at the very instant, would have shewn the time, that the bullet was passing from the mouth of the piece to the board or mark. But it was found upon several trials, that the bullet pierced through the board, which was three inches thick, and did not break a small slender piece of white thread, which was to have stoppt the pendulum.

It was ordered, that Mr. HOOKE should consider of a better way to try this experiment against the next meeting: And

That Dr. CHARLETON and Mr. HOOKE be curators for finding the velocity of sounds with small and great guns, with and against the wind.

Mr. HOOKE reported to the society, that he had begun to make experiments upon the top of St. Paul's steeple for measuring the time of the vibrations of such a pendulum, as reached from the said top down to the floor of the church, which was above 200 feet; and that he had found, that a weight of four pounds being hung on a string of the bigness of a crow's quill, about $\frac{1}{4}$ of the pendulum remained steady, the rest making a single vibration in 6"

Mr. HOOKE's own account of these experiments in a letter to Mr. BOYLE, dated August 25, 1664, and printed among Mr. BOYLE's Works, vol. v. p. 534, is as follows: "I have since your departure been on the top of Paul's steeple, in order to make several experiments, which will be prosecuted this week. But it being the first time I had been there, I could not be so well provided with an apparatus as I found was requisite, and therefore I was fain to return with only making some observations. One was, that a pendulum of the length of one hundred and eighty foot did perform each single vibration in no less time than six whole seconds; so that in a turn and return of the pendulum, the half-second pendulum was several times observed to give twenty-four strokes or vibrations. Another was, that this long pendulum would some-

times vibrate very strangely, which was thus: "The greatest part of the line, by guess about six score foot of the upper part of it, would hang directly perpendicular, and only the lower part vibrate; at what time the vibrations would be much quicker, and this though there was a weight of lead hung at the end of the string of above four pound weight. In another place of the Tower, where I had very clear perpendicular descent, I with the plumb-line found the perpendicular height of it two hundred and four feet very near, which is about sixty feet higher than it was usually reported to be. In which place I shall, with some other company, this week try the velocity of the descent of falling bodies, the Torricellian experiment, and several experiments about pendulums and weighing."

It

It was ordered, that this experiment be repeated; and the Torricellian experiment, together with that of weighing, and of the celerity of descending bodies, be likewise made in the same place.

Dr. WILKINS read a letter from Dr. POPE out of Italy of August 1, 1664, N. S. relating a story of a terrible storm of thunder and lightning, accompanied with hail of the size of great turkey-eggs and tennis-balls; which was ordered to be entered[†], as follows:

“ In this I shall give you an account of a mighty storm, which being a piece
“ of natural history, I hope may be both acceptable to you, and yield matter of
“ discourses to the virtuosos of Gresham-College. Wednesday July 29, S. N.
“ about three of the clock in the afternoon, Mr. EVELYN, two other English gen-
“ tlemen, and myself, being in the way between Venice and Padoua, met with
“ such a violent storm of thunder, rain, and hail, as we had never seen, or scarce
“ heard of before. It was a thunder shower, and did, as they ordinarily do,
“ come against the wind with such impetuosity, that our horses frightened broke
“ their harness, and ran away; our coachman came trembling into the coach to
“ save his life. A coach, a little behind us, ran into the river. After the storm
“ was over, we saved one of the horses, the other was drowned. The thunder
“ seemed greater and more terrible than in England; the rain so vehement, that
“ almost in an instant you might have rowed upon the ways with a gondola; but
“ the hail was most observable, much of it being as big as the biggest turkey-
“ eggs; millions of them of the greatness of tennis-balls; all of them very solid
“ ice, so hard, that I could scarce find any I could break with my teeth. The
“ greatest of them were of an oval figure, or rather more acute and turbidous
“ towards the ends. The second rate were globes compressed, and seemed most
“ of them to have rays proceeding from the center, not unlike the sexangular
“ snow. The third sort, and of which there were the greatest number, were per-
“ fectly round, of the bigness of tennis-balls. They fell with that force, that
“ they broke through the top of the coach in eight places, always through the
“ leather, sometimes through the other livery too; they, that sat on that side of
“ the coach, on which the storm had some power (for it came not full against us)
“ were all black and blue in their arms and sides, as if beaten with cudgels: had
“ not the top of the coach fenced us, we might have been in some danger. It
“ broke the boughs of the trees (several of which I saw bigger than my wrist) and
“ strewed the high way every where so thick with them, as if it had been for a
“ procession. It has done much hurt to the trees, fruit, corn; in breaking the
“ tiles and glass-windows, which this part of Italy only is furnished with. I hear
“ not of any men killed; I suppose the thunder gave them warning, and leisure
“ to retire to shelter. It began at the bottom of the Euganean hills, about six
“ miles from Padoua, went to Venice, we know not how much further, but sup-
“ pose it spent itself in the gulf; the length was more than thirty, the breadth
“ about six miles. They tell incredible stories of the weight of hailstones taken up
“ in the country, but I shall mingle no hearsays with this true relation.”

[†] Lett. r book, vol. i. p. 176.

This story was confirmed by Mr. PALMER, from a letter of Mr. HAMMOND'S.

There was read a paper of Mr. HOOKE'S concerning petrifications, designed by him as a part of his microscopical book, then in the press. The Society approved of the modesty used in his assertions, but advised him to omit what he had delivered concerning the ends of such petrifications.

Sir PAUL NEILE moved, that a copy of the success of the experiment concerning the powder fired in a steel-case, after the way intimated by Col. LONG, might be communicated to him. It was ordered, that the amanuensis should make a copy against the next meeting; as also, that the experiment should be made again at the same time.

Mr. HOWARD was desired to expedite the description of the history of tanning; and likewise of the way of making a kind of silk out of flax.

Dr. WILKINS mentioned, that Mr. HOOKE having a way to discover a second-minute of time by a sun-dial or the stars, to be performed by a certain instrument, which discovery he looked upon as greatly conducing to the finding of the universal measure; it was ordered, that the instrument should be made for that purpose.

The experiment of firing the *pulvis fulminans* being desired to be made, it was deferred till the next meeting; as also, those of measuring refractions.

August 31. At a meeting of the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Mr. PALMER. |
| Sir ROBERT MORAY. | Mr. COLWALL. |
| Sir PETER WYCHE. | Mr. HILL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Dr. WILKINS. | |

It was resolved, that the patent for the several new-fashioned chariots be drawn for Mr. HOOKE and his assistants.

At the meeting of the SOCIETY on the same day,

The experiment of measuring the refraction of common water was made with the new instrument prepared for that purpose; and the angle of inclination being 40 degrees, the angle of refraction was at first, when the hollow cylinder of the engine was not filled up to the wire, 14 degrees; but when the same was so filled, that it just covered the wire, it was 20.

It was ordered, that this experiment with common water be prosecuted, to see how it agreed with what had been of the same kind experimented by others; and that it be done at the several degrees of inclination from the perpendicular, and
with

with several depths of waters: and that it should be tried afterwards with other liquors.

Sir ROBERT MORAY gave an account of the experiment again made on St. PAUL's steeple, with a pendulum of 200 foot long, with an appendant weight of 14 pounds, viz. that it made two vibrations in 15".

He produced a letter of Monf. HUYGENS, dated at the Hague, 29 Aug. 1664, N. S. mentioning an instrument devised by him for measuring the velocity of descending bodies (which was found not much different from that of Mr. HOOKE, invented before) as also, a new observation concerning Saturn, made the last spring at Rome, by one CAMPANI, viz. that the circle of Saturn had covered a part of its sphere above, and had been covered thereby below, even with a little shadow upon the circle below, and upon the sphere above: which observation Monf. HUYGENS looked upon as confirming his system, and to which himself had made one like it. It was also remarked in the same letter, that the said observer at Rome pretended to have a new way of making optic-glasses by the means of a turne, without making use of a mold.

Dr. CLARKE gave an account of a Scotfman, who had, with a blow of a coult-staff upon the side of his head, the skull broken under the temporal muscle, by which the furgeons were forced to make an incision through the said muscle, according to the rectitude of the fibres; where afterwards, applying the trepan, the very bone, on which the trepan was set, came out, with a great many more pieces of bone from each side of it, to the breadth of the palm of a man's hand; so that that very part of the bone, to which the temporal muscle used to be affixed, was altogether lost; yet the man perfectly recovered, performing the functions of eating, talking, &c. as well as ever he did in his life.

A poor man also presented himself, who had formerly received a shot into his belly, breaking his guts in two: whereupon one end of the colon stood out at the left side of his belly, whereby he voided all his excrements.

There was again tried the firing of prince RUPERT's powder in the steel-case closely screwed up, with a small hold drilled in the side of it, thereby to give fire with some touch-powder; but it would not go off, the hole being too little.

It was ordered to try it again the next day, with somewhat a larger hole.

" Mr. OLDENBURG, in a letter written from London, Sept. 1, 1664, to Mr. BOYLE, and printed in the 5th volume, p. 306, 307, of the works of the latter, mentions, that on the Monday preceding, " a club of our philosophers went to PAUL's, " to make experiments of falling bodies and of " pendulums. There were Sir ROBERT MORAY, " Dr. WILKINS, Dr. GODDARD, Mr. PALMER, " Mr. HILL, Mr. HOOKE; and some of them

" went to the top of the steeple, and let down a " pendulum of 200 feet long, with an appendant " weight of pounds, and found two vibrations " thereof made in 15". Time would not then " give leave to proceed to the other experiments, " that were designed, among which will also be " the Torricellian; but they will be set upon " within two or three days." " Letter-book, vol. i. p. 183.

There

There was also made an experiment of the velocity of bodies descending in common water; and it was found, that small-shot, in a narrow glass-cane of 8 1 inches long, fell to the bottom in two seconds and a little more.

It was ordered, that this kind of experiments should be prosecuted, and first with bigger leaden bullets in a bigger vessel: And

That the experiment for finding the velocity of a bullet, to be made at the next meeting.

September 7. The experiments of the velocity of bodies descending in water were prosecuted with balls of wax of several sizes; and it appeared, that in a glass-cane of 8 1 inches long, the lesser balls descended with an equal velocity, but the larger with an unequal.

It was ordered, to prosecute these experiments in a larger vessel, and to prepare that of Dr. GODDARD for it against the next meeting.

The experiment of firing prince RUPERT's powder in the steel-case was tried again, the holes formerly made in the case being stopped up; and it was found, that the powder kept a hissing for a pretty while before it went off, and then made a report, without any breach of the piece, but only opened all the holes, which had been stopped up. It was ordered, that these holes should be screwed up for another experiment, and the touch-hole made somewhat greater.

The president gave an account, that he had tried the flaming of the *pulvis fulminans*, and found, that it flames before it goes off, being put upon a heated iron-plate. He was desired to try it again, by putting the powder into a silver spoon, and so placing it upon the heated iron.

It was ordered, that Dr. CHARLETON and Mr. HOOKE meet the Saturday following in the afternoon, to try the velocity of a bullet shot out of a gun.

Mr. HOOKE gave an account, that the mercury in the Torricellian experiment made at St. PAUL's was on the top of the steeple fallen about half an inch beneath the station thereof at the bottom of the church*. It was ordered to be prosecuted on the Tuesday following, about nine in the morning.

He related, that he had found the stars in Orion's-belt, which Monsr. HUYGENS made but three, to be five.

It was ordered, that he having a thirty-six foot glass, a tube should be made for it, upon the account of the Society, to make celestial observations with.

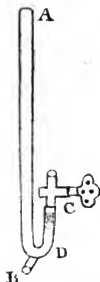
* Mr. HOOKE gives the following account of this experiment in a letter to Mr. BOYLE, dated Thursday, Sept. 8, 1664, printed in Mr. BOYLE's works, vol. v. p. 535. "As for the experiments,

"that I gave you an account of, that I intended
"to prosecute on the top of St. PAUL's, I have,
"by reason of some misarranges, only proceed-
"ed thus far, that drawing up a mercerial tube,

He was put in mind to prepare his instrument for measuring seconds of time by the sun or stars.

It was ordered, that the secretary write to Mr. BOYLE, Dr. WALLIS, and Dr. WREN at Oxford, to get ready an apparatus for observing the conjunction of Mercury with the sun, calculated by astronomers to be on the 25th of October next.

September 14. An account was given by the president, of some experiments made on the top of St. PAUL's steeple: 1. To measure the vibration of a pendulum of 200 feet long, which was found to vibrate thirteen times in 100", the excursion being about 12 feet; and when the excursion was but 1 foot, or thereabouts, there wanted in these thirteen vibrations about 1" or 2" in 100". 2. To discover the difference of the weight of bodies on the top of the steeple and below, where an iron, and cord sufficient to reach from the top to the bottom, being counterpoised with fifteen pounds Troy, and brought to an equilibrium, and the



made, after the form and ordered according to the manner here described: A B, a glass-pipe, about three feet long, whose end A was closed, and the other open at C, and bended in the manner of a syphon, as appears in the figure: Into C was cemented a small stopcock, to open and shut at pleasure; and just in the bending of the pipe was drawn a small hole B, by which the whole instrument, when the cock was stopped, was filled carefully top full with quicksilver: and then the hole was very well stopped with a small plaster of cement, spread on leather, and bound on when hot. Then by inverting the tube, and opening the cock, the quicksilver would fall to its usual station. Then by turning the cock, this instrument became portable, and might easily be carried up and down, without any danger of losing the mercury, or admitting any air: for the mercury would not at all vibrate, which, without the cock, it was so very apt to do, that without a great deal of care and trouble, it could not be stirred or moved, but the air would break in and get above the mercury. I found the quicksilver to be at the top full half an inch lower than it was at the bottom. The manner of

making which experiment was thus: The steeple being without any kind of lofts, but having only here and there some rotten pieces of timber lying across it, I caused a rope to be stretched quite cross the top, and fastened; in the midst of which I fixed a pulley, through which I let down the string and weight to the bottom (for only in the very middle of the steeple was there a broad clear passage from top to bottom) and to this I could not at the top approach within eighteen foot: Having thus let down the rope, those that were at the bottom hung on this mercurial tube (which I had already marked and stopped, and set ready before I went up) a large weather-glass (which moved by the rarefaction and condensation of the air only, which I had likewise marked and stopped) and a sealed thermometer, which I had likewise marked. After these were drawn up, and by the contrivance of another pulley I had drawn them to me, I found the thermometer, the glass being but thin, broken. The quicksilver, upon opening the cock, I found to fall very considerably; which since, upon measuring, I find $2\frac{1}{2}$ of an inch. The weather-glass I found to be risen somewhat more than two inches. Then closing them again, I caused them to be let down; and giving them charge not to let it quite down till I called to them from below, I went down myself, and found, upon opening the mercurial tube, that it rose exactly to its first station; as did also the weather-glass. I had designed to have tried many others then, but the night came so fast, that I could hardly see to get up again, and give order for the clearing of the lines. But I design, within a day or two, to make several other experiments.

iron

iron being let down by the cord, the weight above preponderated the weight below by a drachm. 3. The third experiment was a repetition of the Torricellian experiment, where the mercury was found, as before, to subside on the top of the steeple, about half an inch beneath its standard below.

The experiment of measuring the velocity of falling bodies could not be made, because the instrument for measuring broke. It was therefore ordered to try it another time, as also to repeat the experiment of weighing bodies above and below, by trying it with a single weight on a wire.

It was ordered, that prince RUPERT be desired by Sir ROBERT MORAY to try in his expedition to Guinea the sounding of depths without a line, and the fetching up of water from the bottom of the sea; and that for this purpose a dozen of leaden balls with a couple of wooden balls, as also the water-fetching vessel, be prepared by the operator.

It was ordered likewise, that Mr. HOOKE should contrive a pendulum clock applicable to the observing of the changes of the weather, as well and as cheap as he could, for the use of the society.

Mr. HOOKE gave Mr. BOYLE the following account of these experiments in a letter to him dated from Gresham College September 15, 1664, and printed in Mr. BOYLE'S Works, vol. v. p. 536. "As for the experiments on Paul's, I have, since my last, made several trials, which I suppose will not be unwelcome to you. Upon Tuesday the lord Broucker, Sir ROBERT MORAY, and myself, were again at the same place, and examined the vibrations of a pendulum of 200 feet long. The line was a treble hard twist, one about the bigness of a very small goose-quill; the weight of it was somewhat more than half a pound. At the lower end of this was hung a weight of lead of 28 pounds averdupois. This we found, when each vibration was about 12 or 14 foot, to make one single vibration in 7 seconds and almost an half; that is, we found it to make 13 vibrations in 100 seconds pretty exactly. This we repeated several times, and found the same. Then we suffered it to vibrate not above a foot, and we found them somewhat quicker; that is, 13 vibrations in 98 seconds. After this we tried the same experiment with a small wire about a 3d part of an inch in diameter, to which we hung the same weight, and found the vibrations very much the same, but somewhat faster and longer. This we tried both with longer and shorter vibrations, and found them to correspond with the former. On Wednesday we made farther trials at the same

place, and that was with a very curious beam we brought two weights to an equilibrium at the top of the Tower; the one was a 15 pound weight of brass; the other, that counterpoised it, was a company of smaller brass-weights tied in a small canvas bag together with the former small line; by which, after we had hung the beam over the very middle of the steeple, we let down the bag of weights to the bottom, and with long adjuling we found, that the counterpoising bag and string was grown lighter by a drachm. And this was very observable, that though the weight hung at that distance, and though, by some misfortune, the cock of the beam was missing, yet was the beam so tender, that a very small weight, as some very few grains, would sensibly turn it, and when brought to an equilibrium, the beam would vibrate, as if it had only a pair of short scales hanging to it. The cause of this phenomenon, viz. why the bag, that was let to the bottom, was found lighter, was judged to proceed from the density of the air at the bottom, which, I acquainted you with, as I think, in the last letter. But we repeated the Torricellian experiment since, and found the difference some very small matter less than half an inch. But our weather-glasses again failed us; as did also our instrument for the velocity of falling bodies. Yet some we made, but those so imperfect, that I shall not, till we make them more accurate, trouble you with an account of them."

He was again put in mind to have ready his instrument for discovering second minutes by the sun, &c.

The order for having cast a flat round plate of bell metal to try the vibrations of hard bodies foundling, being renewed, it was moved by Dr. GODDARD, that this plate might be hung both by the middle and the limb.

There was tried again the experiment of breaking a case of iron with prince RUPERT's powder; and the case having its sides three quarters of an inch thick, and containing six penny-weight of the said powder, broke with a very smart report in three pieces^a.

This experiment was ordered to be repeated at the next meeting in the like vessel with four or five penny-weight.

The great square vessel for the trial of descending bodies in water was likewise ordered to be prepared.

September 21. There was read a Latin letter of Monsieur HEVELIUS to Mr. OLDENBURG the secretary, dated at Dantzick September 10, 1664, N. S. giving the Society thanks for the honour, which they had done him in electing him into their body; and containing several particulars concerning his labours in observing the fixed stars, the angle of the orbit of Mercury, and the ecliptic; Dr. WREN's telescopic moon, the observation of the solar eclipse of January 28, N. S. and of the lunar of August 6, 1664, N. S. together with that of August 18, 1663, N. S. It was ordered, that a duplicate of the letter of April 29, 1664, which he mentions not to have received, should be sent him by the secretary, together with the account of what had been observed at London of the eclipse of the moon on the 6th of August 1664.

The president acquainted the society, that the experiment of weighing having been repeated upon the top of St. Paul's steeple, did not succeed this day as before, but that rather the lower weight somewhat preponderated; the cause of which difference was attributed to the windiness of the weather. It was ordered, that the President and Sir ROBERT MORAY should desire the use of the king's statera for

^a Mr. Hooke, in his letter of the 15th of September, cited in the preceding note, mentions this experiment: "We made on Wednesday a very considerable experiment with powder; for inclosing only six penny-weight of prince Rupert's in one of our cylinders (the fashion whereof, I doubt not, you remember) and having very firmly screwed it up, it was fired by a small touch-hole no bigger than a pin's head, which was drilled through the side of it. The effect was, that it broke the cylinder (which was every where very sound, and made of very tough iron, and in the thinnest place, where it broke, was above half an inch, and in some near three

"quarters thick; so that I can hardly think the weight of 100 tun hung at it would have been able to have pulled so much iron in funder point (blank) in four, if not more, pieces, and that in such places, where there was no beginning of a crack, with a most hideous crack and noise, like a small field-piece of ordnance. The side, in which the touch-hole was made, we found intire: nor was that hole any thing widened by the eruption of the fire. We shall yet again make some more trials of it before we leave it, that so we may bring it to some certainty and theory."

^a Letter-book, vol. I. p. 187.

this

this experiment, and therewith weigh both the bodies above and below: and that the committee for this and the other experiment of the celerity of falling bodies, should meet again on the Monday following, about eleven in the morning, at St. PAUL'S.

It was ordered likewise, that the plate for sounding bodies be made ready for the next meeting.

Dr. WREN being desired to defer no longer the making of a larger telescopicall moon for the Society, promised to do it against his next coming to London; upon which it was ordered, that the treasurer should pay for a globe of that size, which Dr. WREN should choose at Mr. Moxon's.

Sir PAUL NEILE offered the Society his optic tube of fifty feet long; for which he received their thanks.

The powder experiment was made again with prince RUPERT'S powder of four penny-weight, in such a case of steel as before. Being fired, it made a report without breaking the case, loosening only the screw, which the operator affirmed to have been screwed in as firmly as two strong men had been-able to do.

There was also made the experiment of sinking a wooden ball with a ball of lead, in a square wooden vessel of about nine feet high, filled with water, having glass panes on the sides. The leaden ball being hung in a springing wire to a ball of wood, fell to the bottom in five seconds, and being fallen off by touching the bottom, the ball of wood returned to the top in nine seconds. And it was observed, that the sizes of the leaden balls being different, the descent of the wooden ball sunk by the leaden ones was always the swifter, the bigger the leaden ones were.

Then there were let fall in the same vessel three balls of bee's-wax of three different sizes, whereof the biggest were observed to descend fastest.

It was ordered, that at the next meeting these experiments be prosecuted with bodies of wood of several figures:

That the experiment of refraction be continued: And

That Mr. HOOKE give a draught of the ciron or wheal-worm, as it appears in a microscope.

September

* Mr. OLDENBURG, in a letter to Mr. BOYLE, dated at London, Sept. 22, 1664, and printed in Mr. BOYLE'S Works, vol. v. p. 307, 308. gives some account of what passed at this meeting of the Society, where, he observes, they had the company of a Parisian academist, recommended to Sir ROBERT MORAY and himself. "I have

" known him, adds Mr. OLDENBURG, to frequent the meetings of Monsieur DE MORTMAR: " his name is Monsieur BLEY, no unlearned, tho' " here unknown, man. He was much pleased " with our experimental method (though we had " not any considerable experiments then ready) " and with our sedate and friendly way of conference."

September 28. The experiment of measuring the velocity of bodies descending in water was prosecuted in the vessel employed at the last meeting; which yet wanted about a foot and half of being full of water, one of the glasses near the top being broken, which made so much water run out. There were used bodies of wood of the same kind and weight, but of different figures, cubical, a double cone, one end of which was tapering three inches, the other end two inches; a single cone, tapering two inches, with a flat basis; another of the same figure, tapering an inch; a pyramid of an inch, and another of the same figure, of two inches; and these three last also with flat bases: then a cylinder, and a globe. All these pieces were tried with an appendant leaden weight of two ounces, and came to the bottom as follows:

| | Half seconds. | |
|---|------------------|--|
| 1. The cubical, in | 12 $\frac{1}{2}$ | |
| 2. The double cone, with the end tapering three inches downwards, | 9 $\frac{1}{2}$ | |
| 3. The same, with the end tapering two inches downwards, | 9 $\frac{1}{2}$ | The same time with the next foregoing as to sense. |
| 4. The single cone, tapering two inches, with a flat basis, | 7 $\frac{1}{2}$ | |
| 5. Another single cone, tapering once inch, with a flat basis, | 11 $\frac{1}{2}$ | circiter. |
| 6. The pyramid of one inch, | 10 | |
| 7. The pyramid of two inches, | 8 | |
| 8. The cylinder, | 12 | circiter. |
| 9. The globe, | 9 $\frac{1}{2}$ | circiter. |

It was ordered, that these experiments be prosecuted at the next meeting; and that the pendulum contrived for falling bodies be applied thereto.

There was read a letter of Dr. WILLIS to Mr. OLDENBURG, dated Sept. 21, 1664^b, giving an account of his having performed the task imposed upon him concerning Mr. HORROX's astronomical papers, by comparing the copies with the

"serenice; as also with the gravity and majestice of our order. We had no other experiments but that of breaking the steel cylinder with prince RUPERT's powder; and the descent of leaden, wooden, and wax balls in water. In the mean time, we supplied what was wanting here, by the reading of HAVELIUS's letter, and some reflections thereon; as also, with letting him see our contrivances for fetching up water from the bottom of the sea, and the sounding balls without a line; both which he was hugely taken with; as also with the stories of compressing a hollow leaden vessel by the pressure of the sea in the Bay of Piseay, and the æolipile by the ambient air, after the in-

"cluded air had been extremely rarefied. I dare say he will extol our institution and proceedings to the sky, wheresoever he comes; though I must needs say, we grow more remiss and careless than I am willing to expatiate upon. Yet this I must say to a person, that I am sure hath a concern for our prosperity, that nothing is done with the king for us; that our meetings are very thin; and that our committees fall to the ground, because it is not possible to bring people together, though I solicit to the making myself troublesome to others, not to say much of the trouble, which I create to myself good store."

^b Letter-book, vol. i. p. 195.

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originals, and digesting all the several pieces into one body, and prefixing to it an epistle addressed to the president of the Society, and giving an account both of the author and the matter, in order to the printing thereof.

It was ordered, that the secretary return the thanks of the Society to Dr. WALLIS, for his great pains and judicious digesting of these papers; and that the printing thereof be left to the consideration of the COUNCIL.

There was likewise read an extract of a letter from Mr. BOYLE to the secretary, desiring, that in the repeating of the experiment of weight made at St. PAUL's, the weight to be let down may not be of the same kind with that, which is to hang always near the beam; but a glass-ball hermetically sealed (with a little quicksilver in it, if need be, to make it equiponderant with the counterpoise) or some other body of considerable bulk in reference to its weight; considering, that if the cause of the decrement of weight of the body let down be, that the air near the earth being thicker, does more resist, and consequently support the most dependent body, than the thinner air does its counterpoise, we may expect, that the lower air being a thicker medium, the more of bulk the body, weighed in the thinner medium, is made to have, retaining there the same weight, the more will it lose of that weight when it comes to be let down into the thicker medium^c.

In the same letter were suggested by Mr. BOYLE, towards the determining the difficulties about the magnetical virtue of the earth, especially in reference to gravity, several magnetical experiments to be made at the bottom and at the top of St. PAUL's steeple; which experiments, though esteemed considerable, yet were thought not practicable at the said steeple, by reason of the iron there mixed every where.

The secretary acquainted the Society with some experiments of refraction, lately made by the virtuosi at Paris, wherein they affirmed, that they had found that the refractions follow the reason of sinus's; and that the refraction of spirit of wine is greater than that of water.

He informed the society likewise, from another letter from Paris, that at Rome observations of Jupiter had lately been made with the new glasses of CAMPANI, by means of which, six belts had been discovered in that planet, four of which had appeared more obscure, and two more clear than the rest of his body.

The secretary having also formerly written to his correspondents in France, to inquire into the truth of the odd experiment delivered by the jesuit CASATI, in his book, intituled, *Terra machinis mota*, p. 143, and received an answer thereto by a person, who had consulted the author of the book himself concerning the same, he communicated it to the Society; the substance of which was^d, that the said CASATI had not tried the experiment himself, but had seen it tried by a

^c Mr. OLDENBURG, in a letter to Mr. BOYLE, dated London, Sept. 29, 1664, and printed in Mr. BOYLE's Works, vol. v. p. 309, observes, that

this experiment was ordered to be made.

^d See the passage of the letter itself in that of Mr. OLDENBURG to Mr. BOYLE cited above.

gentleman,

gentleman, named Don INNOCENZO CONTI, viz. that the liquor extracted out of a certain bismutum, and well rectified, when sealed up hermetically, and exposed to the moon, rose in the full, and fell in the new moon.

The experiments ordered for the next meeting were:

1. Of bodies descending in water.
2. Of powder of three penny-weight in the steel-case.
3. Of the refraction of spirit of wine.
4. Of sounding bodies by a round plate of bell-metal, to be hung up both in the middle and at the limb.
5. Of looking upon some wheal-worms in a microscope.

October 5. At the meeting of the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Dr. MERRET. |
| Sir PETER WYCHE. | Mr. PALMER. |
| Mr. AERSKINE. | Mr. COLWALL. |
| Dr. WILKINS. | Mr. OLDENBURG. |

It was resolved, that the following form be offered to the king for his subscription;

CHARLES R.

Founder, Patron, and one of the ROYAL SOCIETY OF LONDON FOR IMPROVING
NATURAL KNOWLEDGE,

That the following form be offered to the duke of YORK and prince RUPERT, for their subscriptions;

JAMES D.

Fellow of the ROYAL SOCIETY.

RUPERT P.

Fellow of the ROYAL SOCIETY.

And that the following form be used for the subscription of benefactors;

I N. N. give so much ———

It was ordered, that Dr. GODDARD give directions for the preparing of a book, to be called the Charter book, wherein forthwith is to be fairly written a copy of the charter, the statutes, and the register of the fellows and benefactors of the Society, according as is provided by statute:

That Mr. HILL, the treasurer, speedily take care, that the arrears of the Society be collected; as also those of the subscribers for Mr. Hooke; and that in the

the mean time he pay Mr. Hooke both what he had received already from the said subscribers, and, as soon as conveniently he could, what should yet remain due to him; the whole being 80*l.* *per annum* :

That the determination for printing Mr. HORROX's manuscript, as digested by Dr. WALLIS, be deferred till the president shall have perused it, and given his judgment of the fitness of printing it :

That the committee, which used to meet on Mondays in the afternoon at Dr. GODDARD's lodgings, should be intermitted till farther order :

That Mr. Hooke prepare an oration upon the account of Sir JOHN CUTLER's founding of a mechanical lecture* ; and that, between that and the next meeting, he think upon a method to proceed by in his lecture, which, upon the Council's approbation, he might give a hint of in the said oration : And

That the persons intrusted with the affair of Chelsea-college be desired to use their best endeavours to bring that business to an issue.

At the meeting of the SOCIETY on the same day,

The experiments of the refraction of common water and spirit of wine were made ; in the former of which, the angle of inclination being 30°, that of refraction was 41°, 35' ; and in the latter, the angle of inclination remaining the same, that of refraction was 42°, 45' . So that the refraction of spirit of wine was greater by 1°, 10', than that of the water.

The spirit of wine, upon trial, was found to be very well rectified. It was suggested by Dr. GODDARD, that the weight of distilled conduit-water, and well rectified spirit of wine, was in proportion as 1122 to 952 ; and that conduit-water and the distilled water thereof scarce differed in weight.

The experiments of descending bodies in water not succeeding, by reason of the leaking of the vessels, it was ordered, that this should be well provided against for the next meeting.

* Mr. Hooke, in his letter to Mr. BOYLE of Octob. 6, 1664, printed in Mr. BOYLE's Works, vol. v. p. 537, has the following passage : " I am now engaged in a very great design, which I fear I shall find a very hard, difficult, and tedious task ; and that is, the compiling a history of trades and manufactures, the person I formerly told you of, namely, Sir JOHN CUTLER, having very nobly and freely, without any compulsion or excitement, not only kept his word, but been better than it, sending me yesterday a half year's salary beforehand, as an

" earnest of his intention. The most I think I shall be able to do in this business this term (being engaged to read for Dr. POPE) will be only to make a short speech, both in praise of Sir JOHN, my noble patron, and of the excellency and usefulness of the design itself, and what method and course I shall take in it ; and by God's assistance I shall endeavour, to the utmost of my power, to go as far in it as I am able, being resolved wholly to apply my mind, and endeavours to it."

Dr. CROUNE promised to give an account of his experiment of reviving choaked pullets at the next meeting.

The secretary produced an old broken earthen pot, said by one Dr. MOSELER to have been taken up at Tripoli at a fishing for coral, having on its several parts manifest coral-branches concreted.

Dr. CHARLETON and Mr. HOOKE reported of the experiment, which they had made of the velocity of a bullet, shot out of a musket, that, as near as they could observe, the bullet being discharged with prince RUPERT's powder, went above six score yards in half a second. It was ordered to be prosecuted with more exactness.

Dr. CHARLETON mentioned, that he had lately shot a buzzard, which he dissected, and found to have three testes lying almost triangularly, one less than the other two¹. He was desired to shoot another, when he could conveniently, and to dissect it before the Society.

It was ordered, that the anatomical committee meet on the Monday following at two or three in the afternoon at Dr. ENT's house, to consider of the particulars to be observed in the next anatomical administration.

There was again tried the experiment of prince RUPERT's powder, to the quantity of three penny-weight, in the steel-case; the event of which was, that being fired, it came all out by the touch-hole. It was ordered to be tried again with three and a half penny-weight.

The experiments appointed for the next meeting were;

1. Of descending bodies in water.
2. Of the refraction of other liquors.
3. Of reviving choaked pullets.
4. Of the vibration of hard bodies sounding with a flat round plate of bell-metal.
5. The gunpowder experiments, as above-mentioned.

October 12. There were made some experiments of descending bodies in water, the success of which was, that four ounces of lead being hung to all the bodies, which were of the same kind of wood, and the same weight, but of different figures,

¹ Mr. OLDENBURG, in a letter to Mr. BOYLE, dated from London, Octob. 6, 1664, and printed in Mr. BOYLE's Works, v. l. v. p. 310, 311, after mentioning this account of Dr. CHARLETON, adds, "If I had not been afraid of HUDIBRAS, I had seconded Dr. CHARLETON with the relation of a certain apothecary in Ireland, who, as I was

"assured by a physician, that has employed him there, has also three testicles, being excessively given to venery. There is certainly something as well in the conformation of the parts, as in the temper of animals, that necessitate them (if I may say so) to such and such operations."

| | |
|---|-----------------------|
| | Half seconds. |
| The parallelopiped came to the bottom in - - - | 9 fere. |
| Pyramid of two inches high, with the sharp end downward | 7 |
| The same with the flat end downward - - - | 9 and a little more. |
| Pyramid of one inch high, with the sharp end downward | 7½ circiter. |
| Cylinder - - - - - | 9 fere. |
| Cone with the point downward - - - - - | 7 |
| The same with the flat end downward - - - - - | 10 and a little more. |

It was ordered to prosecute these experiments between the days of the meeting with all the varieties, observing also the degrees of velocity; and to shew to the society those, that shall have been thus made, that they might not need to spend long time upon them.

It was ordered likewise, that the experiments of refraction should be prosecuted with salt-water, wines, oil, lixivium, &c. and that it be examined, whether the several refractions follow the proportion of the sinus's; which was the end proposed in these experiments.

It was mentioned, that there was an instrument made for measuring the swiftness of the wind; and that Sir WILLIAM PETTY had observed, that a wind-mill with an ordinary blast of wind turned so often, as to go after the rate of about sixty miles in an hour. He was desired to take care of the making of these experiments, and to observe particularly the difference of the velocity of forced and of free wind; and to bring in an account of all.

Dr. CHARLETON related to the society, that at the meeting of some physicians of the society at Dr. ENT's house, it had been considered by them, what inquiries should be made at the next dissection at Gresham College; whereupon the following had been offered, viz. 1. Whether there be any visible passage of the air into the heart? 2. Whether there be any new vessel in the brain between the *arterie carotides* and the *brachia fornicis*? 3. Whether any liquor may be expressed out of the stomach immediately into the pancreas?

The plate of bell-metal being produced, and found usefess for the experiments of the vibrations of hard bodies sounding, it was ordered, that Sir ROBERT MORAY should be desired to shew it to Monsieur DU SON, who suggested the making of it.

Dr. SMITH acquainted the society with his intention of going into France, and making some stay there, desiring them to honour him with their commands. It was recommended to him to observe what is in the philosophical meeting at Paris, and to inform himself of the French way of ordering vines and wine, and to take notice of all such other particulars, as might serve for the purpose of the society^a.

October

^a Mr. OLDENBURG in a letter to Mr. BOYLE, dated at London, October 13, 1664, and printed in Mr. BOYLE's Works, vol. v. p. 311. observes, that "part of their yesterday's entertainment at

Gresham-College was the hearing of some concertis upon a revived instrument called *Archi-cimb.* invented by a Frenchman twenty-one years ago, and then notified here to Mr. HAAK. There
P p 2 " WEI

October 19. Dr. MERRET brought in his catalogue of trades, which was read and approved of; and it was ordered, that the amanuensis should fairly transcribe it against the next meeting, and that then it should lye exposed, at the time of the meeting of the society, for the several fellows to look it over, and to choose what trade they would give or procure the history of.

WILLIAM GODOLPHIN, esq; was proposed candidate by Dr. CHARLETON.

Sir ROBERT MORAY produced a letter of Monsieur HUYGENS to himself, which was read, containing, 1. A new observation of Jupiter, in whose disk the shadows of two of his satellites had been seen at Rome. 2. An account of watches with two springs fo moved, that whilst the small weight is wound up by the great, it ceaseth not to have just the same force to make the balance wheel, on which it immediately hangs, turn. 3. A speculation of his own, in which, by searching for simple pendulums, isochrone to triangles and other figures, he had met with considerable propositions, which he affirmed to conduce to the establisshing of the universal measure^a. It was ordered, that the several experiments specified in this letter should be tried, and Mr. Hooke take care thereof.

The experiments of the acceleration of bodies descending in water were continued; and there was taken a round glafs, made $\frac{1}{2}$ heavier by shot put into it than water, descending to the bottom in - - - - - 4'' 44''

The same made half as heavy again in - - - - - 3 14

The same $\frac{1}{4}$ as heavy again in - - - - - 2 45

The same made as heavy again in - - - - - 2 14

These experiments were made several times, and are set down above according to their quickest descent.

It was ordered to prosecute this subject at the next meeting.

Dr. CROUNE tried his experiment of reviving a choaked pullet, but it did not succeed,

Sir ROBERT MORAY gave an account of what he had observed in his late excursion into the country, and promised to bring it in writing.

" was about that time made one of them to be presented to the late king. The troubles intervening diverted the music, and left the instrument imperfect, which now is brought again to light, and by my lord BARRINGTON'S care and expences made perfect, comprehending both an organ and a concert of five or six viols in one, giving an excellent harmony, very solemn and most fit for religious music, but only that the multitude of strings maketh it somewhat long and tedious to tune, the alteration of the air putting them out of tune in a little time. M^{rs}.

" SENKUS gave first notice of it hither, saying, in a letter of his, which I have seen, *qu'au ange, à ce qu'il lui sembloit, ne pouvoit proceder plus fin, plinet & gentiment*. I must confess it transports me, and cannot but exceedingly please him, who plays upon it, hearing himself alone perform a whole concert of viols."

^a Mr. O'DENBURG in a letter to Mr. BOYLE of the 20th of October, 1664 (BOYLE'S Works, vol. v. p. 312, 313;) has given an extract of Mons. HUYGENS'S letter, which he desired might be communicated to Dr. WALLIS and Dr. WREN.

Mr.

Mr. Hooke was ordered to take care, that the instrument contrived by him for grinding optic-glasses with more exactness and speed¹, be forthwith made.

"The secretary read part of Mr. Boyle's letter to him, containing several suggestions, viz. 1. That when there shall happen an eclipse of the sun or moon, or any very considerable conjunction of the planets, there might be notice diligently taken by the barometer; whether it had any sensible influence upon the gravitation of the atmosphere. 2. To observe the like in case of the appearing of any great spots in the sun. 3. To inquire after the station of mercury in the baroscope the 4th instant at London, he having found it that day at Oxford lower than ever he had observed it, viz. beneath 29 inches, which, he said, he the rather mentioned, because at that time, and a good while before, the winds were extraordinarily high, though there fell not much rain to alleviate the atmosphere.

The president mentioned hereupon, that he had likewise found the mercury stand beneath 29 inches, but did not remember, whether it was just that day, on which Mr. Boyle had observed it so low.

Mr. Hooke intimated, that he had observed, that upon the fall of the mercury wet weather followed².

Sir PAUL NEALE renewed his former motion of observing the figure of the sun at his rising and setting, both at Whitehall and Greenwich. Sir ROBERT MORAY was desired to observe it at Whitehall, and to recommend the observation of it at Greenwich to Mr. MARRE; which he promised to do.

October 16¹. JOHN NEWBROUGH, esq; was proposed candidate by Dr. WILKINS: And

SAMUEL WOODFORD, esq; by the same.

¹ Mr. Hooke in a letter to Mr. Boyle dated October 21, 1664 (Boyle's Works, vol. v. p. 538.) remarks, that Monsieur Huygens's account of Jupiter's satellites being seen between the body of that planet and the eye, in his letter to Sir ROBERT MORAY, mentioned above, "has at length, says" he, made me fit upon my way of making ob-
"ject-glasses, which, you may remember, I did
"long since acquaint you with: for certainly, if
"these be made with a mandrel only, without
"any tool, as the letter affirms, I hope I have
"reason to expect greater events from this, which
"must certainly be the most accurate way imagi-
"nable for making spherical glasses."

² Mr. Hooke in his letter to Mr. Boyle just cited, remarked, that upon the 4th instant he had found the baroscope very low, and the wind very

high, "many of which instances, added he, I
"have not yet observed; but as soon as I can get
"me a little time to make me a weather-clock,
"and to set all my things in order for the inquir-
"ing into the causes of the changes of weather,
"which, I fear, will not be till after this term, I
"hope I shall be able to give you a better ac-
"count."

³ On this day the greatest part of the members were absent, being gone to Woolwich, together with the king and council and most of the court, to see the great ship St. Catharine launched; as appears from Mr. Hooke's letter to Mr. Boyle, October 29, 1664 (Boyle's Works, vol. v. p. 540.) and Mr. OLDENBURG's letter to that gentleman (*ibid.* p. 314.) Mr. OLDENBURG himself going to Woolwich on that occasion.

Dr.

Dr. CROUNE mentioned, that he had made observations of the sun from Tuesday noon till sun-set, but found no appearance of Mercury^a.

Dr. WILKINS gave an account to the society, that the lord BERKELEY, to whom the queries for the East-Indies were formerly recommended, had spoken with several of the East India company, who, in compliance with his lordship's desire, had mentioned certain persons now in town, who had been very much conversant in the Indies, and being very inquisitive men were thought able to answer most of those queries; promising withal, that such of them, as they could not give a satisfactory answer to, should be recommended by them to their several factors, then resident in the East-Indies.

It was hereupon ordered, that Dr. WILKINS, Mr. COLWALL, and Dr. CROUNE should be desired to speak with those persons (two of whom were Capt. PROUD and Mr. WINTER) to see what informations they could learn from them.

Mr. HENSHAW propounded, that it might be inserted among the queries for the East-Indies, where and after what manner the salt-petre, of which there were such vast quantities imported into Europe, is made.

Dr. CROUNE reported, that he had been lately assured by a person, who had lived long in the court of Macassar, that what had been affirmed of their strange poisons, is for the most part true; and that he had seen hundreds of persons dispatched with them: that none of the European chirurgeons were able, by any means they could use, to hinder the fatal consequences of those poisons, though they immediately cut out the wound made with the poisoned weapon; but that the persons thus wounded would within a very short space fall down stone dead: That he could not affirm any thing concerning the poison's immediate reducing the dead flesh to a jelly, having never seen any such thing.

Mr. POVEY affirmed, that a gentleman of his acquaintance was by the bite of an English viper in the hand, after about a twelvemonth's time, killed, the symptoms being such, that notwithstanding all the care, that was immediately endeavoured to be used, they could not be removed, but a continued chilnel seized on that hand and arm, which were bitten, which caused him to carry them continually wrapt in warm furs; and on a time washing his hand in cold water, it struck such a chilnel on the part, as killed him.

A viper was dissected^b, and it was observed, that besides a row of small sharp teeth on either side of its upper and under jaw, the viper had also two fang teeth.

^a Mr. HOOKE in his letter cited in the preceding note takes notice, that Mercury had been too subtle for those that laid spies for him, by slipping by the sun either in the night, or at least by one side of the disk of the sun; "for to none of those," that endeavoured to find this conjunction here "at London, has there been any glimpse of it; though upon Tuesday, as I imagined we should, we had very fair and clear weather; all which

"day my lord BRONCKER, Sir WILLIAM PETTY, Mr. BALLE, and myself were very diligent in observations. I did not neither omit to observe the sun on Monday and Wednesday, as oft as I had opportunity of seeing it appear from between the clouds."

^b By Mr. HOOKE. See his letter to Mr. BOYLE of October 29, 1664. BOYLE'S Works, vol. v. p. 540.

in the upper jaw, which, upon being provoked, it would thrust and make stand out very far. These through the microscope appeared to be exceedingly sharp and very transparent, nor was there any visible sign of perforation in them; but that tooth on the right side only consisted of two small needle-teeth very sharp, transparent, and lying close together.

Dr. MERRET affirmed, that he had examined the teeth of a rattle-snake (which animal he found exactly like a viper in all its other parts, and therefore thought, that it was not unlikely but the teeth of them might also resemble each other) and observed, that they were very visibly hollow, with a small perforation running through the middle of them from their roots to almost their tops; and that he had farther proved them such, by thrusting a hog's-hair through them.

November 2. At a meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. WILKINS. |
| president. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. WHISTLER. |
| Sir PAUL NEILE. | Mr. PALMER. |
| Sir PETER WYCHE. | Mr. COLWALL. |
| Mr. AERSKINE. | Mr. HOSKYNES. |
| Mr. BALLE. | Mr. OLDENBURG. |

Dr. WILKINS related, that Sir JOHN CUTLER had declared to him, that he was firm in his resolution to settle upon Mr. HOOKE 50*l.* per annum. for such employment, as the Royal Society should put him upon.

It was ordered, that Dr. WILKINS draw up a form of thanks to be given to Sir JOHN CUTLER for his donation, declaring him withal an honorary member of the society, to see whether it be according to his sense.

It was ordered also, that the treasurer prepare the accounts of the society against the Wednesday following; and that the President, Dr. WILKINS, Mr. COLWALL, and Mr. OLDENBURG be a committee to examine the same.

It was resolved, that the society shall become tenants to Mr. COLE for five acres of land by Chelsea College; and that Sir ROBERT MORAY and Sir PAUL NEILE treat and agree with him for the rent of that land.

It was ordered, that Sir ANTHONY MORGAN be desired to draw up a report for the attorney-general to sign concerning the power, which the king hath of the grant of Chelsea College.

That the lists of the society and council be printed for the anniversary election: And

That the operator employ himself diligently in collecting the arrears; and that the treasurer direct him what persons he should collect from.

Act

At the meeting of the SOCIETY on the same day,

MR. JAMES HOAR, MR. GODOLPHIN, MR. NEWBURGH, and MR. WOODFORD were elected :

MR. NEWBURGH was likewise admitted : And

SIR ROBERT ATKINS the younger was proposed candidate by Dr. WILKINS.

There was read an extract of a letter written to the secretary by Mr. BOYLE*, giving an account of a monstrous birth, lately born at Fisherton near Salisbury ; and promising to communicate what observables might farther happen concerning it. It was ordered, that the secretary should endeavour to procure the best attestation he could of this matter before it should be registered.

A letter of Monsieur HUYGENS to SIR ROBERT MORAY was read, containing, 1. An account of a new kind of thermometer[†], with a cane full of salt-water, having swimming in it a wax-ball, mixt with something more ponderous, to make it swim about the middle, rising and falling according to the different degree of heat, without being subject to the various pressure of the air. 2. An intimation of his having farther penetrated into the matter of figured pendulums, and found general rules to give pendulums isochrone as well to solid bodies as to planes. 3. A relation of his having seen with wonder at Paris a glass of twelve foot, of the workmanship of DIVINI, which bore the aperture of two inches Parisian measure ; upon which occasion he recommends it as a matter worthy of inquiry, to know what may be the right aperture in each glass, of such and such a distance from the focus.

SIR PAUL NEELE proposing several difficulties about this last particular of Monsieur HUYGENS's letter, the president was of opinion, that, notwithstanding them, the inquiries concerning the apertures of glasses with proportionable charges, might be attempted.

Mr. HOOKE's account of the refractions of common water, salt-water, and oil of turpentine, was read ; wherein he found the sinus of the angles of inclination to keep near the same proportion to the sinus of the angles of refraction[‡]. It was ordered, that this account be entered together with the experiments about the refraction of spirit of wine[§] ; and that these experiments be prosecuted with other liquors.

There was also read Mr. HOOKE's fuller account of the teeth of a viper seen thro' the microscope transparent and hollow, together with other observations made of

* Supplement to the Letter-book, vol. ii. p. 8.

† Which Monsieur HUYGENS observed he had received from Mr. SLUSE of Liege. See Mr. OLDENBURG's letter to Mr. BOYLE, dated at London, November 3, 1664. BOYLE's Works, vol. v. p. 519.

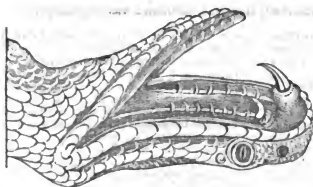
‡ Mr. OLDENBURG in his letter to Mr. BOYLE of November 3, observes, that the proportion of

the sinus of the angles of inclination to the sinus of the angles of refraction were near the same, *v. z.* as four to three : and that as spirit of wine suffers a greater refraction than common water, so oil of turpentine, which is lighter than spirit of wine, bears not only a greater than common water, but a much greater than salt water.

§ Neither of these papers appear in the Register.

the internal parts of that animal; which account was ordered to be registered*, as follow:

“ Examining the mouth of an English she-viper, I found, that in the upper part of the mouth, on either side, just under each eye, was placed a sharp round bended tooth, not unlike in shape to the claws of a cat. I observed likewise, that like those of a cat, they had a kind of sheath or skin, which, when they were moved forward, and thereby erected, slipped off from the tops of them towards the roots of them, leaving that part of the fang without it, very much shaped like a cat's claw, but somewhat smaller and slenderer: but when by another motion of the mouth they were drawn backwards, and so deprest, the skin was drawn over them, and perfectly covered them. That fang on the right side appeared plainly to consist of two teeth, shaped much alike, but the fang on the left side was only one single tooth. These being let alone, till pretty dry, I could plainly perceive to be hollow, by means of several chains of bubbles, which appeared within the transparent hollow teeth; though whilst the viper was alive, I could not perceive the least appearance of hollownes, but the teeth seemed perfectly transparent conical bodies. Besides these fangs, the viper had four rows of smaller teeth; two of which were in the upper and two in the nether chap. The bones, in which these short small teeth (with their very sharp transparent points directed inward) were fastened, were four small bones or jaws, which were not joined together before, but, as in a rhinoceros, each side was distinct, and one of them could be moved without stirring the other. When the viper opened its mouth to bite, these two jaw-bones were drawn forward, and thereby made not only the fangs to be erected and bare, but they themselves seemed to stand more out of the mouth, and the more clear to take hold of what the viper should snap at.



“ The position of these bones in the upper chap was much of the shape in the figure. The under chap had also two jaw-bones, which were not joined together before, as is usual in other creatures, but distinct bones, like those in the upper chap. These lay nearer the tip or chin of the under chap; and about seven small teeth on each side were placed in the fore-part of it:

“ near the top of this chap, between the two rows of teeth, was placed the epiglottis, or orifice of the *aspera arteria*. All the inward parts of this creature were as it were stretched into length and conveniently disposed the whole length of its body. The lungs were spun out into two long conical lobes, consisting of a great number

* Original Register, vol. iii. p. 62.

" of small transparent bladders, covered with a very pellucid skin : the bladder
 " of gall was about three inches beyond the liver, which was very large, and
 " stretcht into a great length : the œsophagus, stomach, and the other guts lay in
 " one continued straight line from its throat (which was exceeding wide, and ca-
 " pable of being stretcht prodigiously) to its tail : the stomach seem'd to be co-
 " vered with a much thicker coat than the rest of the entrails : it had abundance
 " of veins and arteries, that were spread over it : it had a great company of eggs,
 " which were of several sizes, and placed all along the length of the belly. There
 " were several other particulars very notable, which I have not yet sufficiently
 " examined."

It was ordered, that Dr. CHARLETON bring in an account in writing of his per-
 formances in the late dissection.

Mr. HOOKE propos'd an experiment to be made upon a dog by displaying his
 whole thorax, to see how long, by blowing into his lungs, life might be preserv'd,
 and whether any thing could be discovered concerning the mixture of the air with
 the blood in the lungs. It was ordered, that the experiment be made between that
 and the next meeting.

Dr. MERRET produced some of the substance commonly called a star-shoot.
 Some conceiv'd, that it was a mucilaginous matter of a fungus, which the vulgar,
 seeing that meteor called a star-shoot, and running to the place, where they think
 it fell down, and where easily they meet with this matter, judge it to be the star-
 shoot itself. Others were of opinion, that it might be some spermatie matter of
 rams copulating with ewes, and that it was not probable, that it could be a dissolu-
 tion of a fungus, since it was much found upon hills and downs, where no fungus's
 are. Others thought, that it might be frogs dissolv'd, especially since sometimes
 bones were found in it. It was observ'd, that this substance was copiously found

This dissection was performed at Gresham-
 College on the 22d of October, 1664, as appears
 from a letter of Mr. OLDENBURG to Mr. BOYLE
 of that day, printed in Mr. BOYLE's Works, vol. v.
 p. 314. And Mr. OLDENBURG takes notice in
 another letter of the 27th of October (*ibid.* p.
 315.) that Dr. CHARLETON had affirm'd to him,
 that in this dissection the veins on the right and
 left side of the heart were found transpos'd, so that
 the *vena arteriosa* was where the *arteria venosa* used
 to be, and *vice versa*; as also that Dr. SCARBURGH
 had assur'd him (Dr. CHARLETON) that in the body dis-
 sect'd by him at the same time, the *musculus pecti-
 ralis* was wanting. " He added, says Mr. OL-
 " DENBURG, that when he and Dr. ENT told Dr.
 " SCARBURGH of the said transposition of the
 " veins, he urg'd, that the body, already buried,
 " might be unburied again, to give him the sight
 " of so unusual a structure : which whether it be
 " done, or not, I cannot yet inform you " The
 result of this affair is given in the following passage
 of Mr. OLDENBURG's letter of November 3 (*ubi*

supra p. 318.): " Dr. CHARLETON being call'd to
 " an account of his last dissection, and particu-
 " larly press'd concerning the transposition, which
 " I mention'd to you in my former from his own
 " mouth in the presence of others, who heard him
 " as well as I, alledge Dr. ENT for a witness of
 " his assertion, was oblig'd at our yesterday's as-
 " sembly at Gresham to yield, that he was mis-
 " taken; both Dr. ENT, who was with us, and
 " Dr. SCARBURGH, having upon the unburying of
 " the heart, and a strict search and examination,
 " found no such transposition : which discovery
 " of the doctor's error, spread by his very positive
 " affirmations (which made me without scruple
 " deliver it also to you) addeth but very little to his
 " credit. In the mean time the other anatomical
 " observation concerning the defect of the pecto-
 " ral muscle is confirm'd, Dr. ENT himself upon
 " my particular inquiry asserting it with all con-
 " fidence, and that the person, whilst alive, had
 " not appear'd defective in his motions."

in Wiltshire; and that it appeared commonly after the first rains in autumn. Dr. MERRET remarked, that it would not dissolve by boiling in water. He was desir'd to procure some quantity of it, and to make experiments upon it, to see, whether he could discover it to be an animal or vegetable substance.

Dr. WILKINS, Dr. CROUNE, and Mr. COLWALL were put in mind to take a convenient opportunity to speak with Capt. PROUD and Mr. WINTER concerning the East-India inquiries, how far they could be answer'd by them.

Sir ROBERT MORAY undertook to speak to Sir ELLIS LEIGHTON in the name of the society, and to desire him in their behalf, to procure for them a specimen of all the natural productions brought out of Guinea.

Dr. CROUNE offer'd to send the inquiries of the society for the East-Indies, and to procure a good answer to them. The amanuensis was order'd to make a copy of those inquiries, and to insert the query concerning the manner of making saltpetre in those parts.

He was desir'd to bring in writing a punctual account of the operations of the strange poisons us'd by the king of Macassar in the island of Celebes; which he promis'd to do.

Dr. ENT was desir'd to dissect some vipers and frogs in a convenient season; and Dr. WILKINS and Mr. HOOKE to be present at the operation.

Dr. ENT was put in mind of the account, which he formerly promis'd to give in, concerning oysters.

Sir ROBERT MORAY produc'd a paper of the earl of CRAWFORD-LINDSEY, the reading of which was defer'd till the next meeting.

Mr. HOOKE was order'd to endeavour to have his new instrument for grinding optic-glasses ready against the next meeting.

Capt. TAYLOR brought in some curious stones, amongst which was a very fine serpentine-stone, and some *alumen plumosum*.

November 9. At a meeting of the COUNCIL were present

The lord viscount Brouncker,
president.

Mr. HOWARD.

Sir PAUL NEILE.

Sir ROBERT MORAY.

Sir ANTHONY MORGAN.

Mr. AERSKINE.

Mr. BALLE.

Mr. PALMER.

Dr. WILKINS.

Dr. GODDARD.

Mr. HILL.

Mr. COLWALL.

Mr. HOSKYNES.

Mr. OLDENBURG.

It was ordered, that the treasurer bring in his accounts at the next meeting:

That the lifts of the society and the council be printed for the anniversary election day; and that Mr. HOARE, Mr. GODOLPHIN, Mr. WOODFORD, and Mr. BEAL, though not yet admitted, be inserted: And

That the charter-book be made ready with all possible speed to be presented to the king.

Sir ANTHONY MORGAN promised to draw up a report for the attorney-general to sign concerning his majesty's power to give a grant of Chelsea College.

Sir PAUL NEILE reported, that Mr. COLE had declared to him, that he would by no means take any more from the society for the five acres of land lying about Chelsea College, than he could get from others, without any collusion; and that he would cause a lease to be drawn up, for the society to become his tenants.

At the meeting of the SOCIETY on the same day,

Sir ROBERT ATKYNS the younger was elected.

Sir JOHN CUTLER having founded a lecture, and settled an annual stipend of fifty pounds upon Mr. HOOKE, as professor, during his life, intrusting the society with direction and care thereof, was elected honorary member of the society. And Sir WILLIAM PETTY, Dr. WILKINS, Dr. WHISTLER, and Mr. GRAUNT were appointed to attend him in the name of the society, with the following order:

" Upon report made to this society by Dr. WHISTLER, that Sir JOHN CUTLER
" knt. and bart. had declared his resolution to bestow upon Mr. ROBERT HOOKE,
" during his life, an annual stipend of fifty pounds, to be paid half-yearly, having
" already advanced the sum of twenty-five pounds for the first half year ending at
" Lady-day next; in consideration of which yearly stipend, the said Sir JOHN
" CUTLER is willing to refer it to the president, council, and fellows of the Royal
" Society of London for improving natural knowledge, to direct and appoint the
" said Mr. HOOKE how many lectures he shall read, and when, and upon what
" subjects; or what kind of inquiries, by way of experiment, he shall be engaged
" to prosecute; this society doth hereupon return their hearty thanks to Sir JOHN
" CUTLER for his particular favour to a worthy member, and for that respect and
" confidence he hath hereby expressed towards the whole body: And they do like-
" wise unanimously agree to admit the said Sir JOHN CUTLER an honorary mem-
" ber of this society, to have the liberty of being present at their meetings, when
" and as often as he pleaseth, without being obliged to any payments or other tasks.
" And Sir WILLIAM PETTY, Dr. WILKINS, Dr. WHISTLER, and Mr. GRAUNT

* Mr. OLDENBURG in a letter to Mr. BOYLE, dated at London November 10, 1664 (BOYLE'S Works, vol. v. p. 322.) has this passage: " Our council is now pressing to have an end of Chel-

sea College; which, we doubt not, but it will prove good; in which case Mr. HOWARD will be the society's gardener, without admitting of any competitor, and Dr. WILKINS the weeder."

** are

"are hereby appointed to attend Sir JOHN CUTLER in the name of the society,
 "and to represent to him what a sense they have of his favour, which they have
 "the more reason to value, as being the first donation they have been intrusted
 "with of this kind, and which they hope will prove a leading example to others."

There were read two letters of Mr. BOYLE to the secretary, one of which gave an account of the death and dissection of the double child born at Fisherton near Salisbury*, that they died the third day after they were born; one of them about a quarter of an hour before the other; and that, being opened, they were found to have their parts double, and duly formed and placed, except that the guts being continued from the pylorus of both the stomachs about six feet, upon inflation afterwards met in a common channel; and that from thence to the blind gut the length was above one foot, and thence two feet to the fundament, which they had but single; as also the matrix.

The other letter gave notice of an anatomical observation made in a body dissected at Oxford, having but one kidney, and never having had more, seeing that the emulgent vessels, which used to go to the right and to the left-hand to the respective kidneys placed in those opposite sides, terminated in this one kidney, which was near as big as two ordinary ones, and which was furnished with two ureters inserted into the bladder at the usual places†. This person died of a dropsy at the age of about thirty-five years, having been notorious for a stout drinker; and if he had not been so, Mr. BOYLE was of opinion, that his single kidney might perhaps have served his turn for many years longer.

It was ordered, that Mr. BOYLE should be desired to leave with the society the Latin original of Mr. WILLIAM HAND, concerning the dissection of the monstrous birth, of which a copy should be made for him.

An account was brought in by Mr. HOOKE of an experiment of refraction made with pure and clear salad-oil, which was found to have a much greater refraction than any liquor, which he had yet tried; the angle of refraction, that answered to an angle of inclination of 30 degrees, being found no less than 46 deg. 30'; and the angle of refraction, that answered to an angle of inclination of 20 deg, being 29 deg. 47'.

It was ordered, that this experiment be made before the society at the next meeting, and that the instrument be fixed; as also, that other liquors, as several wines, aqua fortis, aqua regia, milk, &c. be tried, and that in several temperaments of heat and cold.

Mr. HOOKE acquainted the society in writing with the success of the experiment made upon a dog cut open alive, and kept so for above a whole hour, by means

* See Mr. BOYLE'S Works, vol. v. p. 315—318.

† Mr. OLDENBURG in his letter to Mr. BOYLE of November 10, 1664 (BOYLE'S Works, vol. v. p. 321.) remarks, that Dr. ENT mentioned upon this occasion, that he had observed, that when one kidney was stopt, there commonly followed an ichthuria.

of a pair of bellows and a pipe thrust into the wind-pipe of the dog; whereby the lungs being blown, the heart continued beating for a long while after the thorax and belly had been displayed, and a great part of the diaphragm cut away.

It was ordered, that this account be entered⁷, and that the physicians of the society consider against the next meeting, whether and how the experiment might be farther improved.

Mr. Hooke's account was as follows :

" In prosecution of some inquiries into the nature of respiration in several animals, a dog was dissected, and by means of a pair of bellows, and a certain pipe thrust into the wind-pipe of the dog, the heart continued beating for a very long while after all the thorax and belly had been opened; nay, after the diaphragm had been in great part cut away, and the pericardium removed from the heart. And from several trials made, it seemed very probable, that this motion might have been continued as long, almost, as there was any blood left within the vessels of the dog: for the motion of the heart seemed very little changed, after above an hour's time, from the first displaying the thorax; though we found, that upon removing the bellows, the lungs would presently grow flaccid, and the heart begin to have convulsive motions: but upon renewing the motion of the bellows, the heart recovered its former motion, and the convulsions ceased. Though I made a ligature upon all the great vessels, that went into the lower part of its body, I could not find any alteration in the pulse of the heart; the circulation, it seems, being performed some other way. I could not perceive any thing distinctly, whether the air did unite and mix with the blood; nor did I in the least perceive the heart to swell upon the extension of the lungs: nor did the lungs seem to swell upon the contraction of the heart."

It being said, that air was felt to pass through the lungs, Dr. GODDARD conceived, that it might do so upon a stretch, and by more than ordinary force: but if it should do so in an animal unopened, and pass in a considerable quantity into his breast, and lodge there between it and the lungs, it might be a prejudice and hindrance to the motion of the lungs.

The star-shoot, vulgarly so called, being again spoken of, it was suggested by Dr. WILKINS, whether it might not be the matter, that being spewed out of the earth, would produce a fungus, if their time of growing was not spent. Dr. MERRET said, that if it were a fungous substance, it would turn to water, which it did not do, nor dissolve in oil. Others were of opinion, that the rankness of the smell seemed to show it to be an animal substance.

Mr. HILL mentioned a book lately published in Italy, as Dr. POPE had written to him, containing 800 sorts of fungus's.

⁷ Original Register, vol. iii. p. 64.

Dr. MERRET remarked, that there were above an hundred sorts of them in England.

Mr. HENSHAW related an observation, which he had made in France, of the frog-spawn, and promised to bring it in writings.

Sir ROBERT MORAY mentioned a certain substance seen by him, both floating upon the sea near the shore, and left also on the shore, being like a jelly or starch, seeming to contract and dilate itself, and which being dissolved in water, yielded a very offensive smell. His account was confirmed by Mr. HENSHAW.

Dr. WILKINS acquainting the society, that some of the East-India company were ready to attend them, to give satisfaction to some of their inquiries, it was ordered, that the president, and as many of the committee for correspondence, as conveniently could, should give them a meeting on the Friday se'nnight following in the afternoon at some place, which should be agreed upon between this and that time.

Mr. EVELYN presented the society with his *Parallel of the antient architecture with the modern, in a collection of ten principal authors, who have written upon the five orders: from the French of ROLAND FREART, Sieur de Cambray. To which is added an account of architects and architecture in an historical and etymological explanation of certain terms particularly affected by architects: printed at London 1664, in folio.*

Mr. HENSHAW presented to the society his brother's book, entituled, *A register of the air.*

Sir ROBERT MORAY produced a written account of the earl of CRAWFORD-LINDSEY concerning setting and planting of trees several ways.

Mr. PALMER produced a very heavy mineral-stone, conceived to be tin-ore, which was referred to Mr. HOOKE to weigh it in water.

The experiments appointed for the next meeting were,

1. Of refractions.
2. Of making simple pendulums isochrone to triangles and other figures and bodies differently suspended.

November 16. At the meeting of the COUNCIL were present,

The lord viscount Brouncker,
president.

Mr. HOWARD.

Mr. AERSKINE.

Sir PAUL NEILE.

Sir ROBERT MORAY.

Sir PETER WYCHE.

Mr. BALLE.

Dr. WILKINS.

Dr. GODDARD.

Mr. HILL.

Mr. COLWALL.

Mr. HOSKYNs.

Mr. OLDENBURG.

It was ordered, that the lists and summons be printed against the Monday following, and the summons directed by the amanuensis, and then by the operator brought to the president to sign them :

That Dr. WILKINS draw up a diploma in English for Sir JOHN CUTLER as honorary member of the society : And

That the amanuensis extract out of the charter the title of the society, and what concerns their power to purchase, and to plead and be impleaded, for the use of Mr. COLE.

It was resolved, that there shall be a curator by office ; and that Mr. HOOKE be proposed to the society as such.

At the meeting of the SOCIETY on the same day,

Sir ROBERT ATKYNS the younger and Mr. WOODFORD were admitted.

THOMAS THYNNE, esq; was proposed candidate by Sir PAUL NEILE ; and NICHOLAS BAGNAL, esq; by Mr. BALLE.

The president, according to the statute, gave notice of the anniversary election-day approaching, and how much it imported the good of the society to choose such persons into the council, as were most likely to attend the meetings and business of the council ; and thereupon desired the society to consider of this matter, and of the persons fit for that purpose.

The secretary produced a small French book, written by father CHARLES BURGONIS against Monsieur PASCAL's Treatise of the equilibrium of liquors and the weight of the air. It was printed at Paris in 1664, and intituled, *La verité du vuide contre la vuide de la verité, ou l'on decouvre la veritable cause des effets, qui jusques icy ont esté attribuez à l'horreur de vuide, contre l'erreur, qui les attribue à la pesanteur de la masse de l'air : par le P. CHARLES BOURGONIS, religieux Augustin.* The president took it home for his perusal, in order to give an account of it to the society.

It being suggested, that those philosophical books, which were presented to the society, might be perused by some or other of the fellows thereof, and Dr. HENSHAW having lately caused his *Register for the air* to be presented, Dr. GODDARD was desired to peruse it, and to make a report thereof to the society.

Mr. HOOKE undertook to dissect a viper, and to bring in his observations upon it at the next meeting.

Dr. MILLINGTON had leave to be present at this meeting, introduced by Dr. WILKINS ; Mr. TYRREL by Mr. AERSKINE, and Dr. NEEDHAM by Sir ROBERT MORAY.

Mention

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Mention being made again of the experiment upon a dog cut open alive, and kept so above an hour by means of bellows thrust into his pipe, &c. Dr. NEBBHAM related, that they had lately dissected a dog at Oxford, and by blowing into the receptaculum chyle, renewed the beating of the heart without the motion of the lungs.

Mr. Hooke reported, that the mineral stone, supposed to be a tin-stone, produced by Mr. PALMER at the preceding meeting, being weighed in water, was found to be $6\frac{1}{2}$ times as heavy as water.

The president mentioned, that upon his own observations, by the mercurial barometer, the temper of the air, as to heat and cold, might be known, as well as to its pressure.

It was ordered, that observations of this kind should be made with canes of greater difference, and with more nice divisions; those of the president not being intended for such, nor taken notice of till lately.

Monsieur HUYGENS's experiment of simple pendulums being isochrone to triangles and other figures and bodies differently suspended were begun to be made, verifying what he had written, that a triangle rectangle and isosceles being suspended by the top, or by the middle of its base, and agitated on the side, is isochrone to the simple pendulum of its perpendicular altitude.

Mr. HOWARD produced a little piece of the fat of a man, who had, by his relation, been buried thirty years, and whose body was all consumed except a lump of fat, from which the piece, that was shewn, was taken; which being put upon the fire, burnt and smelt like fat.

There were read two or three experiments of refraction, viz. with cold, hot, and salt water, of which the hot and cold water were refracted alike, their angle of inclination being 30 deg. that of refraction 42 deg. *ferè*. But the salt-water at the same angle of inclination had an angle of refraction of 44 deg. By which it seemed, that salt increases the refraction.

It was ordered, that water should be farther tried with several degrees of saltiness, to see, whether by the degree of refraction the degree or quantity of salt might be discovered; as also with several sorts of salt fixed and volatile, especially to observe, whether volatile salts dissolved in water would increase the refraction.

It was hinted, that by the experiments of refraction hitherto made it seemed, that the simplest liquors have the least refraction; and, on the contrary, that liquors consisting of different parts suffer greater refractions.

Dr. GODDARD proposed, that trial might be made of turbid and coloured waters. Others proposed oil of vitriol, spirit of nitre, aqua regia, and aqua fortis; and to let

VOL. I.

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the ray pass out of air into water, and out of that into other kinds of liquors, and out of them into glasses, &c. to see how the refractions thus ordered differ.

Sir ROBERT MORAY inquired, whether a contrivance might not be made to observe the refractions of steams and smokes, &c.

He moved, that the refractions of one and the same liquor might be tried at several inclinations.

Mr. HOOKE proposed to find the difference of the refractions of air, and the vacuity of air in a glass.

He was ordered to bring in a list of experiments of refractions at the next meeting.

The experiments appointed for the next meeting were the refractions of oil of turpentine and other liquors.

And Mr. HOOKE was ordered to give an account of his anatomical experiment.

November 23. At the meeting of the COUNCIL were present.

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Dr. GODDARD. |
| president. | Mr. PALMER. |
| Sir PAUL NEILE; | Mr. BALLE. |
| Sir ROBERT MORAY, | Mr. COLWALL. |
| Mr. HOWARD. | Mr. HILL. |
| Sir ANTHONY MORGAN. | Mr. HOSKYNs. |
| Sir PETER WYCHE. | Mr. OLDENBURG. |
| Dr. WILKINS. | |

It was ordered, that the president be desired to declare to the society this afternoon, that the council thought good to have a curator by office, and to allow him *pro tempore* 30 l. per annum :

That Mr. HOOKE standing for a curator's place, be this afternoon proposed candidate by Dr. WILKINS; as the doctor nominated him to the council :

That the president be desired to sign a licence for the printing of Mr. HOOKE's microscopical book : And

* Mr. HOOKE, in a letter to Mr. BOYLE, dated at London November 24. 1664 (BOYLE's Works, vol. v. p. 541, 542.) mentions, that his microscopical observations had been printed off above a month; " and the day, *adds he*, that has retarded " the publishing of them, has been the examination of them by several members of the society; " and the preface, which will be large, and has

" been layed very long in the hands of some, who " were to read it. I am very much troubled there " is so great an expectation raised of that pamphlet, " let, being very conscious, that there is nothing " in it, that can answer that expectation; but such " as it is, I hope I shall prevail with the printer to " dispatch it some time this or the next week."

That

That Mr. HOOKE give notice in the dedication of that work to the society, that though they have licensed it, yet they own no theory, nor will be thought to do so: and that the several hypotheses and theories laid down by him therein, are not delivered as certainties, but as conjectures; and that he intends not at all to obtrude or expose them to the world as the opinion of the society*.

At the meeting of the SOCIETY on the same day,

Mr. GODOLPHIN was admitted:

Mr. BAGNAL elected and admitted:

Mr. THYNNE elected: And

JOHN HERVEY, esq; treasurer to the queen, proposed candidate by the president.

The president, according to statute, nominated five of the fellows of the society, who were not members of the council, to be a committee for auditing and examining this year's accounts of the treasurer; which fellows were Sir WILLIAM PETTY, Sir JOHN LOWTHER, Mr. NEILE, Dr. BALLE, and Mr. GRAUNT; and they were likewise, according to statute, put to the ballot, and all five elected of the said committee; which was ordered to meet for the purpose above-mentioned at Sir JOHN LOWTHER's lodgings on the Monday following in the afternoon.

The president produced two letters, containing an account of some natural things observed in Iceland, by way of answers to some inquiries sent thither from the society. One of these letters, written July 26, 1664, by PAUL BIORNONIS to Mr. FLINT at Runtun, gave some account of the effects of cold, the icy mountains, hot springs, and husbandry of that country. The other, written by the said FLINT November 14, 1664, gave a fuller information of several particulars relating to the said island, as he had received it from the mariners, who went thither, viz. concerning the mountains of ice, and their generation; the appearance of the celestial bodies; the tides, winds, variation of the magnetic needle, the kinds of vegetables growing there, the constitution and humour of the natives.

The president was desired to solicit an answer to the rest of the queries; and it was ordered, that an extract of these letters should be made, and inserted in the Letter-book^b, as follows:

* Mr. HOOKE accordingly, in his dedication to the Royal Society inserted the following passage: "The rules you have prescribed yourselves in your philosophical progress, do seem the best, that have ever yet been practised; and particularly that of avoiding dogmatizing, and the espousal of any hypothesis not sufficiently grounded and confirmed by experiments. This way seems the most excellent, and may preserve both philosophy and natural history from its former corruptions. In saying which I may seem to con-

"demn my own course in this treatise, in which there may perhaps be some expressions, which may seem more positive than your prescriptions will permit. And though I desire to have them understood only as conjectures and queries (which your method does not altogether disallow) yet if even in those I have exceeded, it is fit, that I should declare, that it was not done by your directions."

^b Letter-book, vol. i. p. 206—210.

R r r 2

"My

“ MY LORD,

“ I have at last transmitted to your lordship an account of Iceland, which had
 “ come sooner to your hands, but that I have hitherto wanted the convenience
 “ of a safe messenger. Your lordship knows too well how imperfect it is ; which
 “ happens, partly because my correspondent doth here profess himself in this his
 “ *αὐτογραφος* but a stranger, and partly because my letter came not to his hand till
 “ our fleet was coming away ; but he told my messenger, that by the next return
 “ he would send me some seeds of plants, and birds, and insects alive (if possible)
 “ such as our country doth not afford ; and that he would make farther inquiry
 “ into all the queries by the help of some others : and what satisfaction the coun-
 “ try can give of itself, I dare promise your lordship by the next post.

“ In the mean time, besides this account, which your lordship may receive by
 “ this letter, map, and book (which I suppose no rarity to your knowledge) I
 “ have laboured to give your lordship some farther satisfaction from the mariners,
 “ that go constantly thither.

“ The islands of ice are generally supposed to have their first matter from the
 “ mountains in Greenland, and being frozen before they come into the sea, they
 “ then receive the impulses of the salt-water, which being broken by its own vio-
 “ lence, is soon frozen to the first fresh crust, which by northern winds are driven
 “ down to islands, and by reiterated combats with the waves, augment their
 “ magnitude to thirty-five and sometimes forty fathom beneath the water. I am
 “ certainly informed, by a very skilful and honest master, that he observed one of
 “ these islands to ground, and soon after, upon the tide, it floated away ; and he
 “ went directly to the place and founded, and found it thirty-five fathom ; and
 “ that another, by the same experiment, had found it in another place forty
 “ fathom. These islands do yet receive a farther increase from the snow, which
 “ being melted by rains, and then frozen again, makes the upper part very
 “ hard and compact, and in height above the water, eight, ten, and sometimes
 “ twelve foot.

“ Witches (or persons so supposed) are in that country : a particular relation
 “ of that query I expect by another hand.

“ The bodies of the sun and moon seem much larger there than here : the just
 “ diameters I have not yet obtained.

“ The moon hath appeared to our mariners, who always come away in the
 “ beginning of August, within fourteen hours after the change.

“ The tides rise and fall unequally in the several ports, as here in England ; but
 “ very seldom rise or fall above three foot, for the most part two, or two and a
 “ half : the spring tides and common tides happen much about the same time
 “ with us,

" The winds are unconstant there as here, save only from a place, which they call Fairforeland to Kettle-bay (which is about eighteen leagues) the wind blows constantly either S. W. or N. E. which is just the situation of that country.

" I sent a weather-glass, which your lordship may perceive by the letter, wherein I find his mistake, as if it were expected again: another was broken in the carriage; the third I have, which I think I shall have an opportunity to send to Greenland. I received this bladder, which was taken from one of the largest sheep, wherein I observe the air to be expanded since I received it.

" Meats boiled or roasted retain that accidental heat there, more than twice as long as here.

" The magnetical needle varies unequally, declining faster (but still unequally) as they come near the land.

" There are few birds, beasts, fishes, or insects, which we have not here: what are rare I expect by the next. Few or no birds will live there in winter, except the raven.

" There is no wood, which grows there except birch, which seldom grows big enough to be serviceable for building: but they are in some measure supplied with good fir-trees, blown upon their coasts; nor can I yet receive any good satisfaction from whence they come; they suppose from Norway, but the winds, which bring them thither, do point more northerly.

" The natives are strong, healthy, and very kind, though coarse and dirty; their apparel very rough and homely, being waddmall; their houses are commonly grotts or vaults made in the side of a hill, and covered with turf, which is also their firing. Whey, when it is sour, is their beer, and stock-fish is their bread; beef and mutton (if it die alone) is their food, for then they say it is of CHRIST's own killing, and ought to be reckoned in the number of delicacies.

" One of the natives came to Yarmouth with this fleet, and came to my house to give me a visit; but not having been at any university, nor of profound natural parts, I could not learn so much from him as from our own seamen.

" My Lord, what is defective in this narrative, I shall endeavour to supply in my next, having heard of another in that country, who is very curious in natural disquisitions, and solid in his resolutions. If your lordship please to add any more queries to the former, and impart them to Sir ROBERT PASTON, they will safely come to the hands of,

" MY LORD,

" Your lordship's most humble,

" and most faithful servant,

" R O. FLINT."

" *An extract of a letter written by PAULUS BIORNONIS, out of Iceland, to which the*
" precedent letter referreth.

" ——— Nullus pinguis liquor gelu apud nos corripitur, neque spiritus vini.
 " Gelu, ubi maxime, tres pedes penetrat terram, sæpissime duos. Infulas glacia-
 " les nullas novi; solum frustra glaciei Groenlandicæ, quæ borea flante huc impel-
 " luntur, nata in aquis Groenlandicis; atque exinde ejecta in mare, subinde accre-
 " scentia cumulis nivium; eminent verò hæc frustra ex mari, ubi maxime, duo-
 " decem pedes. Fontes calidi hic multi, adeo ferventes, ut ad dimidium horæ
 " caro bovina, ollâ cum frigida aqua imposita, fatis decoquatur, ne dum sufficiat
 " ad deplumandam avem. De Hecla aliisque ejusmodi montibus, ut de Ætna in
 " Sicilia, idem judicium. Agricultura apud nos nulla, vaccæ sæno hyeme vi-
 " vunt; equi, oves, gramine, quod à nivè liberum est sæpissime.

" Verum nunc tabellarius urget, ut ipse vides: promitto tibi igitur, quantum
 " in me est, quàm primum licet, responsonem, qualis sperari à me poterit."

The lord BRERETON mentioned the experiment, which he had made in the coun-
 try, of causing beer to be brewed of barley without malting, by turning it into
 bread, and that it succeeded very well; only that some caution must be used in
 the practice thereof, *viz.* that the bread must not be mashed too small, the water
 not be heated too hot, nor the pieces of bread lie too close upon one another, &c.
 Whereof his lordship promised to bring in a fuller account hereafter.

He mentioned likewise, that potatoes also would make good beer; of which
 the Society should have an account in due time.

There was made an experiment of oil of turpentine and common oil; and it
 was found, that the former, at an angle of inclination of 30°, had an angle of re-
 fraction of 40° 59', and the latter, at the same angle of inclination, an angle of
 refraction of 46° 29'.

Sir ROBERT MORAY proposed, out of a letter of Monsr. HUYGENS, that the
 whole tube might be filled with the liquor, the refraction of which was to be ex-
 amined, and the glais put at the lower end, and set exactly at right angles to the
 tube.

He likewise moved, that these kinds of experiments might be made with several
 quantities of the liquors, and with vessels of several sizes containing them.

He proposed also a way to know certainly the refractions of celestial bodies, *viz.*
 that since watches are reduced to that exactness, that they do not fail a minute in
 three or four months, to shew the sun's mean motion, that for the perfect know-
 ledge of the refractions of the sun, moon, and stars, there needs no more for the
 sun than a sun-dial, by which one may know the minutes and seconds of the hour;
 which being compared with those of such an exact watch, and the difference re-
 duced to degrees and minutes, shew the refraction precisely.

Mr.

Mr. Hooke mentioned an instrument for measuring the refraction, which celestial bodies suffer in the air. He was ordered to bring in a scheme of it at the next meeting; as also, to take care, that his quadrant be made ready for discovering a second minute by a sun-dial or the stars.

The president gave the Society an account of a new way for making an universal measure, proposed in a letter to Sir ROBERT MORAY by Monf. HUYGENS*, as being his own invention; which is as follows: The distance of the center of the bullet from the point of suspension, as the first term (the semediameter of the bullet being the second term) added to two fifths of the third proportion: 1 term, equals the distance of the center of vibration from the point of suspension. To apply which to an universal measure, take a bullet of any metal, and hang it by a very fine string, which make of that length, that it may vibrate just seconds, or half-seconds; and when you have the exact measure of time, according to this rule, you have the certain length of the center of vibration, which is the universal measure. The length Monf. HUYGENS finds to be $9\frac{1}{2}$ Rhynland inches, the vibrations being half-seconds.

It was ordered, that against the next meeting there be prepared two pendulums vibrating half-seconds, with balls having diameters one considerably bigger than the other; and that they be adjusted before, to see whether the proportion held.

It was ordered likewise, that the secretary look over the notes of the last winter's meetings, to see what experiments concerning cold were then suggested and left untried: And

That the experiments for refractions be continued, according to the list brought in by Mr. Hooke⁴.

Mr.

* This letter is dated at the Hague, Nov. 21, 1664. N. S. and is entered in the Letter book of the Society, vol. i. p. 225—228. Mr. OLDENBURG, in a letter to Mr. BOYLE, of Decemb. 3, 1664. (BOYLE'S Works, vol. v. p. 328.) remarks, that when this letter of Monf. HUYGENS was read to the Society, order was given, that it should be punctually registered at the same time, to the end, that Monf. HUYGENS might have his due, and that his inventions be recorded for his honour to posterity, as well as the inventions of the English virtuosi. "This justice and generosity of our Society," adds Mr. OLDENBURG, "is exceedingly commendable, and doth rejoice me, as often as I think of it, chiefly upon this account, that I thence persuade myself, that all ingenious men will be thereby encouraged to impart their knowledge and discoveries, as far as they may, not doubting of the observance of the old law of *junius cuiusque tribuere*."

⁴ These experiments were designed, as appears from a letter of Mr. OLDENBURG to Mr. BOYLE, dated at London, Nov. 24, 1664. (BOYLE'S Works, vol. v. p. 326) to examine the refraction answering to several degrees of inclination: To examine the comparative refraction of several liquors to common water; as, of all sorts of oils, made by expression or distillation; and to do this with several degrees of inclination: To examine how much the refractions of liquors are altered by mixing of several liquors together, that do, as it were, penetrate each other; as having examined the refraction of oil of vitriol and common water each of them apart, to mix them together, and find what is the compounded refraction, by mixing also of acid and sulphureous liquors, &c. To examine farther the refraction of liquors, wherein hath been dissolved a determinate quantity of some kind of salt, as of sea salt, common salt, salt-petre, alum, vitriol, alkali, tartar, &c. To examine the comparative

Mr. HOOKE was, by Dr. WILKINS, proposed curator by office to the Society; and the president acquainted them, that the COUNCIL had found it necessary to have a curator; and that they would allow him, *pro tempore*, thirty pounds a year, the present revenue of the Society not being well able to bear a greater allowance; and that Mr. HOOKE was contented with that sum for the present, Sir JOHN CUTLER having settled upon him, during life, fifty pounds a year, upon the account of reading lectures of experimental philosophy: which addition had made him willing to accept, *pro tempore*, of thirty pounds a year from the Society for performing the office of a curator.

The Society voted, that he should be dispensed with, as to the visitation of the COUNCIL.

Mr. HOOKE mentioned a way of finding a second minute by a telescope, and was ordered to put this into practice.

He was ordered to make another dissection of a viper, and to do it in the presence of Dr. ENT and some other physicians of the Society, for the same purpose, for which he had lately done it; whereof he brought in an account in writing, which was read, and ordered to be registered*, as follows:

“ In prosecution of some inquiries about respiration, I dissected a viper, and
“ examining its lungs, I found the particulars very notable :

1. “ That having opened all the thorax and belly of the viper, from head to
“ tail, I found, that it was able to extend a little, and as it were fill its lungs, notwithstanding a great part of them were open to the external air; the reason of
“ which seems to be, that the part drying very fast, the film of the lung stuck
“ fast to the *pleura*, or concave side of the ribs, and thereby, upon the opening
“ of those ribs, the lungs were opened also: but this was accidental and not natural, the lungs at first seeming not to stick or adhere to them at all.

2. “ I found, that by thrusting a small pipe into the *aspera arteria*, and blowing
“ in at it, I was able to distend the lungs to a very great bigness; and by making
“ a ligature in the throat, about the *aspera arteria*, the air blown into them would
“ continue to keep them extended, without finding any passage out.

rative refraction of a liquor, when a greater quantity of the same salt is dissolved in it, and when a less; as also, the refraction of a liquor, when two or more liquors have been dissolved in it; and the refraction of several liquors, wherein colours have been dissolved. Then to proceed to examine the refraction of all kinds of solid bodies, as diamonds, crystal, glass, ice, gummos and resinous substances, horn, arsenic, and all other transparent

bodies; the refraction of several coloured glasses; and to find, by what means the refraction of glass may be augmented or diminished, and to examine also the refraction and structure of the several humours and parts of the eye; and to observe the refraction of the air of several densities; and lastly, to observe what would be the best figure and the best material to make dioptric lens's.

* Original Register, vol. iii. p. 65.

3. “ By

3. " By thus blowing, I found the lungs to be exceeding large, and to reach from the mouth almost to more than half the length of its body. The upper part next the throat looked like a company of bubbles in a parcel of froth; but the lower part looked very thin, clear, and transparent, exactly like a bladder, without any sign of diaphragms or partitions. This transparent cylindrical bladder seemed, when thus filled, as big about as the body of the viper, and was about some four or five inches long: upon pricking which with a point of a knife, the whole lungs subsided, and could not, by blowing it through the *aspera arteria*, be afterwards filled.

4. " Upon opening the lungs, I found they were nothing but one continued bladder, from the throat to the middle of the belly; not seeming to have any kind of partition or parenchyma, but only to consist of a very thin skin or bladder: only the upper part of it looked almost like a net, but the under part consisted of a film, as clear as the bladder of a carp: and examining it with a microscope, I could not find any kind of vessel or muscle in it. But,

5. " Upon examining the upper part with a microscope, I found, that the network, I formerly mentioned, was a contexture of veins and arteries, which were variously implicated and interwoven in the manner of a net; and I could plainly perceive all along the sides of those vessels several small chains of bubbles of air, which, whether they were separated from the blood to be discharged into the lungs, or rather whether they were separated from the air in the lungs to be mixt with the blood, I was not able by this dissection to discover.

6. " It was notable also, that the *aspera arteria* reached from the mouth to more than half the length of the lungs; and though it were kept open by small bended cartilages as in other creatures, yet all these cartilages were so contrived, that the pipe seemed to be slit on one side from top to bottom: that is, each of them were bended somewhat more than half a circle, but none of them did perfectly meet, and make a circle: A particular providence certainly of nature."

The president gave an account to the society of father BOURGONIS's book against Monsieur PASCAL, which his lordship observ'd did not so much refute Monsieur PASCAL, as introduce another hypothesis, whereby he could indeed solve all the phenomena, but, in the president's opinion, not so rationally, as it was done the other way; founding the whole upon rarefaction and the *motus nexus*, an hypothesis inconceivable to considering men.

November

" This last paragraph is not entered in the Journal-book of the Society, but taken from Mr. OLDENBURG's letter to Mr. BOYLE of November 24, 1664, cited in the preceding note; in which letter he remarks, that there had been the day before a noble appearance at the meeting of the Royal Society, and as much life, *says he*, as ever I saw there. " And no question this Society would prove a mighty and important body, if they had but any competent flock to carry on their designs; and

VOL. I.

" if all the members thereof could but be induced, " to contribute every one their part and talent for, " the growth, health, and welfare of their own " body: which, methinks, is one of the most reasonable things in the world, and consequently " should be easy to be persuaded to dole, that " make profession of reason and virtue. There have, " been lately elected into the Society Sir ROBERT ATKINS the younger, Mr. GODOLPHIN, Mr. BAGNALL, Mr. THYNNE, Mr. HOARE, comp-

S f f

" trolle

November 30. Upon this anniversary day of election of a new council for the year ensuing, there was first a report brought of the treasurer's accounts by the committee chosen at the last meeting to examine them, viz. that it appeared, that the treasurer had received from Mr. BALLE, the former treasurer, 17l. 1s. 8d. from Mr. COLWALL as a gift 50l. for admissions since the 15th of December 1663, to the 17th of this present November, 35l. 14s. and for weekly contributions, 119l. 1s. 6d. making in all 221l. 17s. 2d. Out of which there had been paid by warrant and allowance of the president or council before the 18th of this present November, 170l. 15s. 10d. So that there remained in cash 51l. 1s. 4d. which with the 100l. given by Mr. BALLE, and 343l. 2s. being the arrears due from several members at Michaelmas preceding, made in all 494l. 3s. 4d.

The bishop of Exeter* suggested, that there being such arrears, a strict order might be issued for the collecting thereof.

Mr. THYNNE and Mr. HOARE were admitted.

After this the society, being 53 or 54 in number, proceeded to election, according to the order prescribed in their statutes.

Of the old COUNCIL were continued the following eleven,

| | |
|-----------------------------|----------------|
| The lord viscount BOUNCKER. | Dr. GODDARD. |
| Mr. HOWARD. | Mr. PALMER. |
| Sir ROBERT MORAY. | Mr. COLWALL. |
| Sir PAUL NEILE. | Mr. HILL. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Dr. WILKINS. | |

The ten new ones chosen in were these:

| | |
|----------------------------|--------------|
| The lord bishop of EXETER. | Mr. HENSHAW. |
| The lord ASHLEY. | Dr. CLARKE. |
| Sir JOHN LOWTHER. | Dr. CROUNE. |
| Sir WILLIAM PETTY. | Dr. BALLE. |
| Mr. SLINGESBY. | Mr. GRAUNT. |

Out of this new election were chosen for officers,

| |
|--|
| The lord viscount BOUNCKER, President. |
| Mr. HILL, Treasurer. |
| Dr. WILKINS |
| Mr. OLDENBURG } Secretaries. |

* troller of the Mint, Mr. WOODFORD, Sir JOHN CUTLER (Mr. Hooke's benefactor) and yesterday the President proposed Mr. HEAVEY, the queen's treasurer, for candidate; inasmuch, that we are now full one hundred and fifty men. Mr. SPRAET intends to begin next week to print the History of our institution, which hath been perused by lord BOUNCKER, Sir ROBERT MORAY, Dr. WILKINS, Mr. EVELYN, and others; but we are troubled, that you cannot

have a sight of it before the publication. I see the author hath divided his discourse into three general heads.—I must confess the style is excellent, even, full, unaffected; but I know not, whether there be enough said of particulars; or, to speak more truly, whether there are performances enough for a Royal Society, that hath been at work so considerable a time."

* Dr. SETH WARD.

The

The new members of the council were all sworn, except the lord ASHLEY and Sir JOHN LOWTHER, being both absent.

This being done, Monsieur LE FEBURE presented his printed discourse, both in French and English, upon the preparation of Sir WALTER RALEIGH's cordial.

He likewise read a Latin letter sent him from Paris, and signed for attestation by some of the principal physicians and chirurgeons of that city, concerning the art practised by one Monsieur BIENNAISE, of healing tendons and nerves transversely cut, so as to restore the patient to the full use of his limbs. He was desired to leave the letter with the society, which he promised to do, after he had shewn it to some of the college of physicians.

December 7. At a meeting of the COUNCIL were present

| | |
|-----------------------------|----------------|
| The lord viscount BOUNCKER, | Mr. SLINGESBY. |
| president. | Mr. HENSHAW. |
| The lord bishop of EXETER. | Mr. PALMER. |
| Mr. HOWARD. | Mr. HILL. |
| Mr. AERSKINE. | Mr. COLWALL. |
| Sir PAUL NEILE. | Dr. BALLE. |
| Sir JOHN LOWTHER. | Dr. CROUNE. |
| Sir WILLIAM PETTY. | Mr. OLDENBURG. |

Sir JOHN LOWTHER was sworn as member of the council.

The treasurer, Mr. HILL, and both the secretaries, Dr. WILKINS and Mr. OLDENBURG, were sworn as such.

Dr. WILKINS proposed Mr. HOOKE as candidate for a curator's place.

It was ordered, that Mr. HOOKE be not examined as curator.

It was ordered, that Sir WILLIAM PETTY, Dr. WILKINS, and Mr. GRAUNT draw up a form concerning the name and subject of Mr. HOOKE's lecture, and shew it to Sir JOHN CUTLER, the founder thereof, to receive his thoughts upon it.

It was ordered likewise, that Dr. WILKINS do produce the catalogue of the entries of the society's Register-books, as it was given in by Dr. MERRET.

It being suggested, that there were several persons of the society, whose genius was very proper and inclined to improve the English tongue, and particularly for philosophical purposes; it was voted, that there be a committee for improving the English language; and that they meet at Sir PETER WYCHE's lodgings in Gray's-Inn, once or twice a month, and give an account of their proceedings to the society, when called upon.

The persons following, or any three, or more of them, were nominated to constitute this committee :

| | |
|----------------------|-------------------|
| Mr. AERSKINE. | Mr. HENSHAW. |
| Sir ROBERT ATKYNS. | Mr. HOSKYNs. |
| Mr. AUSTEN. | Mr. NEILE. |
| Sir JOHN BIRKENHEAD. | Sir THOMAS NOTTE. |
| Dr. CLARKE. | Mr. SPRAT. |
| Dr. CROUNE. | Mr. SOUTHWELL. |
| Mr. DRYDEN. | Sir SAMUEL TUKE. |
| Mr. ELLISE. | Mr. WALLER. |
| Mr. EVELYN. | Mr. WILLIAMSON. |
| Sir JOHN FINCH. | Mr. MATTHEW WREN. |
| Mr. GGDOLPHIN. | |

It was ordered, that this committee at their first meeting choose a chairman out of their number.

At the meeting of the SOCIETY on the same day,

Mr. HERVEY was elected.

The experiment for the verifying of Monsieur HUYGENs's rule concerning the universal measure was made twice, there being taken a very small bullet with a line of the length of $15\frac{1}{8}$ inches; and two wooden balls, one of three, the other of six inches; which being adjusted with the former line, it was found in the first trial, that the line of the ball of three inches diameter was $13\frac{1}{2}$ inches long; which added to the semi-diameter of the ball made the length of the vibration from the point of suspension to be fifteen inches; and the line of the ball of six inches diameter was twelve inches long, which added to the semi-diameter of the ball, made the whole length to be fifteen inches. In the second trial it was as before, except that the pendulum with the ball of three inches was adjusted to $13\frac{1}{8}$, to make it vibrate equally with the other two.

This being calculated and compared with Monsieur HUYGENs's rule, was found to approach very near to it.

Mr. HOOKE was ordered to attend the president on the Friday following, to adjust the pendulum to vibrate seconds.

The lord BRERETON presented a book written by JOSEPH GLANVILL, M. A. intituled, *Scepſis ſcientifica: or confeſſed ignorance the way of ſcience, in an eſſay of the vanity of dogmatizing and confident opinion*^a, dedicated to the Society; the dedication of which¹ was read.

^a Printed at London 1665, in 4to. The ſubſtance of this book was publiſhed at London 1661, in 8vo, under the title of, *The vanity of dogmatizing, or confidence in opinions: maniſeſted in a diſcourſe of the ſhortneſs and uncertainty of our knowledge and its cauſes*.

¹ In it M. GLANVILL expreſſes a very great reſpect for the Society and its deſign; " which," ſays Mr. OLDENBURG in a letter to Mr. BOYLE,

" dated December 10, 1664 (BOYLE's Works, vol. v. p. 328.) I was very glad, and ſo were others, to find to be ſo well underſtood at laſt by ſome, though, I fear, the great expectation he raiſeth of their enterpriſe may be of more prejudice than advantage to them, if they be not competently endowed with a revenue to carry on their undertakings."

Mr.

Mr. GLANVILL, the author, was proposed candidate by the lord BRERETON.

THOMAS ROLT, esq; was likewise proposed candidate by Dr. WILKINS, to whom he was recommended by Dr. COXE, who could not himself be present to propose Mr. ROLT.

Mr. HOOKE gave some account of the experiments of refraction made by him since the last meeting with solutions of vitriol, salt-petre, and alum, in water; where he had found the refraction of the solution of vitriol and salt-petre a little more, but that of alum somewhat less, than common water.

It was ordered, that at the next meeting the whole tube of the refracting instrument be filled with the liquor, the refraction of which was to be examined, and the glass be put at the lower end, exactly set at right angles to the tube; as also, that these experiments be made with several quantities of the liquor, and in vessels of several sizes; and that with liquors turbid and coloured as well as clear.

Mr. HENSHAW's account of the nature of frogs spawn was read, and ordered to be registered*.

" Having found in the writings of RONDELETIUS, PARACELSIUS, and HORSTIUS, a paradox, wherein they seemed much to boast of their discovery, not without some pity of the ignorance of vulgar naturalists; which was, that batrachum, or, as we commonly call it, frog-spawn, was a spontaneous production of nature, at the very entrance of the spring, on the surface of all standing shallow waters; such as we most usually see contained in ditches by the high-way side; blaming much the grossness of their understanding, who could believe any animal was able to emit at once so great a quantity of sperm, as should so many times outweigh its own body, as a bunch of frog-spawn does the body of a frog; and PARACELSIUS, in several of his writings, but more particularly in his treatise *De Magno Mundi Mæro*, endeavouring to persuade us, that this frog-spawn is the sperm of the world; and that in the spring, when nature does *præire in generationem*, she every where sends out this sperm towards the superficies of the earth, and that those numerous families of insects, when they begin to stir abroad, receive thence a great encrease, by an equivocal generation; besides, that all vegetables are not only by it revived into a new verdure, but have their growth and nutriment from it during the whole summer: but that it is never visible to us, unless in these standing waters, where at that time are no plants to attract and exhaust it: that the frogs, by a peculiar instinct of nature, do take delight to dabble and wanton in it, and by that means impregnate it with an irradiation of their own species; telling us farther, that a skilful artist, by the adaptation of a proper encheiria, may be able to do wonders out of this universal sperm:

" This pompous way of philosophizing begat no less curiosity in me, to try what discoveries I could make concerning the production of this frog-spawn; by ap-

* Original Register, vol. iii. p. 67.

" plying,

plying my own observation to attend its birth at the proper time of the year. In order whereunto, I did some years since ride out towards the end of February, at which time (unless the weather be very cold and frosty) the frogs do leave their winter-quarters, to visit the light again. I had in my company a friend, who by the authority of the forenamed authors was wholly gained over to their opinion. We rode not far ere we came to a place, where there was a vast number of frogs creeping about on the ground, at a little distance from a ditch side: they were almost all coupled together in the act of generation; the female moving up and down with the male on her back, clinging close to her, and clasping his fore legs under her throat. I did observe, that the females were larger than the males, and something different from them in colour. After I a while considered them, I took up into my hand a pair of these frogs thus coupled, and having with some difficulty severed the male from her, I cut open the belly of the female with a pen-knife, where I found a bunch, not so big as my thumb, of those black round eggs (which are always seen in the frog's spawn, though of a larger magnitude, and at a greater distance) strongly sticking together, by a whitish glutinous slime, that was about them, and which, having handled them a little, stuck so fast to my fingers, I could hardly rub it off. The frog died almost as soon as I had opened her belly; but my friend being not sufficiently convinced with the demonstration, I took the frog, and laid her into the water near the brink of the ditch that was by, to see what effect the water would have on her eggs; and then riding on to take the air, about an hour and an half after we came back, and found the frog turned in the water on her belly by the weight of her eggs, which were now grown almost to the size of any bunch of frog-spawn we could find in the ditch; and that white slime, which held the black eggs together, being dilated and swelled with the water, was grown to a softer mucilage, not so glutinous, and very transparent: and to express all in a word, it was in all circumstances exactly resembling the common frog-spawn."

Mention being made, that the catalogues of trades, formerly brought in by Dr. MERRET, might be looked over by the members, in order to choose out of them such as they would give the history of, and the bishop of Exeter intimating, that he had a printed catalogue of that kind, he was desired to compare the written with the printed one, and to make additions, if he should meet with any thing omitted therein; which he promised to do.

It was suggested, that it would be convenient to have this catalogue printed.

A review being made of what experiments of cold were suggested the winter preceding, but left untried, it was found, that the following were then proposed, but not made: 1. To make a standard of heat and cold by observing the precise degree of cold, which freezeth common distilled water, and by marking thereupon the expansion of the liquor of the thermometer. 2. To include a loadstone in ice, in order to see what alteration it produces either in its attractive or directive virtue, or in both. 3. To reduce water into ice without blebs; and then to try, whether such ice, shaped into a cone, would serve for a burning-glass. 4. To put

put water into the receiver of the pneumatic engine, and having exhausted it, to let it freeze there, to see whether it becomes a clearer ice.

It was ordered, that these experiments should be made by Mr. HOOKE, when the weather serves :

That he bring in the scheme for the instrument to measure the refraction, which the celestial bodies suffer in the air :

That he have his quadrant made for discovering a second minute by the stars : And

That he try at the next meeting Monsieur HUYGENS's way of a thermometer with a cane of salt-water and a glass-ball swimming in it.

Mr. HOWARD produced a French paper about ordering of vines, sent him from Sir SAMUEL Tuke out of France ; which was ordered to be translated into English against the next meeting.

December 14. At a meeting of the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. PALMER. |
| president. | Dr. WILKINS. |
| Mr. HOWARD. | Dr. GODDARD. |
| Sir ROBERT MORAY. | Dr. CLARKE. |
| Sir PAUL NEILE. | Mr. HILL. |
| Sir WILLIAM PETTY. | Mr. GRAUNT. |
| Mr. AERSKINE. | Mr. OLDENBURG. |
| Mr. HENSHAW. | |

Sir WILLIAM PETTY made a report, that Sir JOHN CUTLER, intending a particular kindness to Mr. HOOKE in founding the new lecture, and bestowing upon him as reader fifty pounds *per annum*. desired, that he might not be more burthened than the other readers of Gresham-College are, but read only as many lectures in the vacations, as they do in term-time : and farther, that Sir JOHN CUTLER had intimated, that the management of this lecture by the Society, during Mr. HOOKE's life, should be a measure to him, to make it perpetual, or not.

Hereupon the subject and number of these lectures were much debated ; and it was agreed upon, that the subject of them should be the *History of Nature and Art* : but with regard to the number of the lectures, it was not resolved upon, some urging, that Mr. HOOKE should be ordered to read once upon all the ordinary weekly meeting days of the vacations, except those of the three months of August, September, and October, the greater part of half an hour, beginning about two of the clock : others pressing, that Mr. HOOKE might read but as many lectures as other professors do ; and that the rest of the Wednesdays might be left to be endowed by some other benefactor for another philosophical professor.

At the meeting of the SOCIETY on the same day,

Mr. GLANVILL and Mr. ROLT were elected and admitted.

Sir NICHOLAS SLANNING was proposed candidate by Mr. EVELYN:

There was read an account of the culture of vines sent from Paris by Sir SAMUEL TUKE to Mr. HOWARD; which was ordered to be filed up.

The experiment mentioned by Monsieur HUYGENS of making a thermometer with a cane of salt-water and a glass-ball poised in it, was tried; and it was found, that the glass-ball rose and subsided, according to the alterations of heat and cold. It was ordered, that it be kept and compared with the other thermometers, in order to see whether it be so nice and sensible as they.

There was read a paper sent from Oxford by Mr. BOYLE to the secretary, containing certain proposals of Mr. AUSTEN, about the planting of fruit and timber-trees, which Mr. AUSTEN desired might be recommended to the parliament. It was referred to the committee for agriculture to consider of it.

There was also read an extract of Mr. BOYLE's letter to the secretary, containing experiments of cutting in dogs the sixth pair of nerves, called *par vagum*; whereupon the pulse was quite altered and intermitted, and the dogs continued near four days alive, though under great discomposure.

Sir ROBERT MORAY mentioned, that Dr. WREN had formerly promised to Sir PAUL NEILE and himself, to communicate to him his lectures read at Gresham-College upon the dioptrics; and moved, that he might be desired to bring the same into the society; which request was made accordingly.

Sir ROBERT MORAY made a report, that Sir ELLIS LEIGHTON being spoken to by him, according to the order of the society, had promised him, that he would take a special care of procuring for the society what natural productions could be obtained from Guinea.

Dr. GODDARD gave some account of Dr. HENSHAW's book, intitled, *A Register for the Air*, which he had been desired to peruse, viz. that the main point, which the author seemed to aim at in it, was to deliver a new method of changing the air, without removing from one place to another, by means of an air-chamber fitted for that purpose. And that he seemed to consider only in the air its density and rarity, in order to the health of men: but that physicians considered other qualities therein, in relation to mens bodies.

Dr. ENT took notice, that the author of this book made respiration chiefly serve for the speedier circulation of the blood from the one ventricle to the other: but Dr. ENT added, that all phenomena did not agree with this hypothesis.

The

The experiment of Monsieur HUYGENS for the universal measure was repeated twice; and the first time the string of the biggest ball (which was of six inches diameter) was 2 feet $11\frac{1}{2}$ inches long; and that of the smaller ball was 3 feet $1\frac{1}{2}$ inch long. The president having calculated the proportions, according to Monf. HUYGENS's rule, found them vary from it $\frac{1}{16}$, the string of the smaller bullet being $\frac{1}{16}$ longer than it should be, according to that hypothesis. In the second trial the difference was yet greater, viz. $\frac{1}{16}$ or $\frac{1}{8}$ or $\frac{1}{4}$, which was thought too considerable a difference for a standard.

It was hereupon concluded, that there must be either some mistake in the rule, or some fault in the experiment.

The president hinted, that the difference of the air and the bullet might vary the length of the line. So that a small bullet in a clear air, and a great bullet in a thick air, would cause different measures.

Mr. HOOKE suggested, that it would be best to make pendulums of the shortest length, considering, that a little variation in length makes a great alteration in time.

He produced a paper, containing some considerations of his about the most likely way of settling an universal measure; which was ordered to be registered, as follows:

" It seems to me, that the most convenient substance of a pendulous body for this purpose should be some one simple or unmixt metal, such as refined gold, refined silver, clean copper, tin, lead, or iron; for thereby all the parts of it will most likely be of an equal density and gravity: whereas if it should consist of two distinct substances, there might arise some inconveniency from the disproportionate gravities or densities of these two bodies, in respect of others the like; as if part of the pendulous body was made of iron, part of tin, the proportion between divers sorts of iron and divers sorts of tin being not always the same, might create some irregularity.

2. " The most convenient shape seems to be some kind of prismatical body, by which I mean any kind of body, that may be supposed to be made up of an infinity of equal polygonal superficies or thin plates, placed directly one upon another; such as a triangle, square, rhombus, pentagon, hexagon, circle, &c. cut at right angles out of an equally thick plate of any very clean metal, and vibrating on any one corner or determinate part of it edgewise: for by this means it will be no matter how thick the plate be, whether the hundredth part of an inch, or an hundred inches.

3. " As to the time, to which the vibration of such a pendulous body should be adjusted, the shortest time seems the best; first in respect of the make and substance of the pendulous body, being much more easily made of a small figure

¹ Original Register, vol. iii. p. 69.

“ than of a larger: but next, and chiefly, in respect of the time; for the length of regular pendulous bodies being in a duplicate proportion to their times, the greater the length is, any small error in the time makes the error in the length the greater; and therefore, a pendulous body, that vibrates seconds, is much better than if we could have a pendulum to vibrate minutes; and one to vibrate every eighth part of a second is much better than one to vibrate seconds, or any longer time. And an error in one eight times shorter will be 64 times more easily distinguished than in the longer; that is, the shortening or lengthening the shorter pendulum $\frac{1}{8}$ of an inch will make as sensible a variation in the time, as lengthening or shortening the whole an inch.

“ But whether this will afford us an exact standard of the measure of space or extension, may seem dubious from these particulars:

“ First, from the nature of the motions of the heavens; for though it be generally presumed, that their motions are so constant, as to make their revolutions now, in the same space of time they ever have done, and ever will do: yet it is possible their revolutions may have been ten times as swift as now they are, and that they may in time be moved yet slower. For as we find here upon earth, the circular motion of a wheel, or top, or any the like turbinated body, which receives any kind of impediment from the medium, in which it is moved, or from any other external accident, is by degrees made much more slow, than when it received its last impulse; so may the celestial bodies, since their first impulse they received at the creation; that set them in motion, be, by the impediment of the medium, through which they pass (though it seem the most fluid substance in the world) so impeded, that they may have lost very much of their first velocity: so that perhaps the men of the first age of the world, before the flood, might live no longer time than men do now, though they might see and number ten times more revolutions of the sun and heavens. Which if it should be so, the length of a pendulum to vibrate a second of time, reckoned by the revolution of the heavens at the beginning of the world, would have been found but a hundredth part of the length we find now fit for that purpose; and perhaps, if the motion of the heavens wax slower, the length of such a pendulum must be much more increased.

“ Secondly, From the nature of the principle, that moves the pendulum: for if the gravity of the earth be altered, either by time or place, all endeavours of making a standard this way will be in vain; for whensoever and wheresoever the gravity of the earth is stronger, there must the length of a second pendulum be much longer; and when and where it is weaker, there must it be shorter. The reasons, that may make each of these probable, seem to be these:

“ First, That all bodies and motions in the world seem to be subject to change, of which we may find instances, even in the very sun itself.

“ Next, We find, that the magnetical properties of the earth do in a very little time alter, and are sometimes more, sometimes less intense; and the line of di-

"rections and the point, to which it tends, seem to be varied with some irregular motions: if therefore the gravitation of the earth be magnetical, that may also alter.

"Thirdly, If the gravity of the earth do any way depend upon the magnetic virtue of it, it is possible that property may be stronger toward the pole than about the equator (for we find the attractive virtue of the loadstone to be so); and if so, the standard by a pendulum will be uncertain, because a second pendulum toward the poles will be much longer than near the equator."

He gave also some account of what he had done at the lord viscount Brouncker's house in adjusting the pendulum to vibrate seconds, viz. that his lordship's pendulum vibrating just seconds, went a little quicker than those tried at Gresham-College for seconds; and that the length of the pendulum for seconds at his lordship's was 3 feet $\frac{1}{4}$ inch, and the ball of three inches diameter.

The experiment of trying the refraction of common water by filling the whole tube of the refracting instrument with it, was tried; and it was found, that it agreed with the usual way of trying the refraction of that liquor.

Mr. Hooke produced the scheme for the instrument of measuring the refraction of celestial bodies; which was ordered to be registered^m.

December 21. At a meeting of the COUNCIL were present

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|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. AERSKINE. |
| president. | Mr. SLINGESBY. |
| Sir ROBERT MORAY. | Dr. GODDARD. |
| Sir PAUL NEILE. | Mr. BALLE. |
| Sir JOHN LOWTHER. | Mr. OLDENBURG. |

The president moved, that licence might be granted to Dr. CHARLTON for the printing his book *De puero fulmine isto, & de cerebro*ⁿ, by the printers of the Society.

It was ordered, that this licence be granted, but that two passages in the preface be left out, or altered to the satisfaction of the president, before the book be licensed:

That the council be summoned against the Wednesday following at six in the evening, to consider of the recommending a curator to the Society: And

That Dr. WILKINS, Dr. GODDARD, and Dr. CROUNE be a committee to consider of the particulars to be inserted in the relation of the Society's institution^o.

^m It does not appear in the Register.

ⁿ This book was published at London 1665, in 8vo, under the title of, *Disquisitiones duae anatomicae*.

physicae, altera anatome pueri caelo tacti, altera de proprietatibus cerebri humani.

^o By Mr. SPRAT.

At a meeting of the SOCIETY on the same day,

Sir NICHOLAS SLANNING was elected :

Sir WILLIAM PORTMAN, knt. bart. and knt. of the Bath, was proposed candidate by Mr. GRAUNT : And

Sir WINSTONE CHURCHILL by Sir WILLIAM PETTY.

There were read three several accounts of the comet lately seen^r, one by Sir ROBERT MORAY, as he observed it December 17 at Whitehall; another sent from Portsmouth, as it was seen by the earl of SANDWICH on board of the London at Spithead; a third sent from Ireland, as it was seen at Dublin by Mr. KEARNEY and another gentleman severally, both agreeing in their observations.

Every member of the society was desired to make farther observations as exactly as they could, and to communicate them.

Mr. PALMER produced a certain compounded metal, which he said was used by a gentleman to take off a seal from Spanish wax, by softening and working it into the seal after such a manner, that it received the perfect impression thereof; which done he could harden the metal, and withal reduce it to a less volume.

The secretary produced several pearls fished up in Cardiganshire in Wales, in the river Tivy, some of which was as big as ordinary pease; others as fair as oriental ones; but many altogether brown, one of which being broken appeared to have a little stone in it, severed from a superinduced crust. It gave occasion to discourse of the possibility of whitening and giving a lustre to pearls. Mr. HENSHAW mentioned, that having opened some oriental pearls of an ill colour, and found a blackish dirty ground in them, he thence concluded, that it was in vain to endeavour to make them shine. Mr. HOSKYNs added, that he had once removed the outer skin of an oriental pearl, and found the body underneath as yellow as gold, and under that a pearl of a very good lustre.

Mr. HOOKE was ordered to shew the society such pearl coloured glass, as he had made formerly.

There were tried two wooden circular pendulums, one after another, hung by the edge; one of 18, the other of 9 inches diameter, with a small pendulum of $\frac{2}{3}$ the length of the diameters of those wooden circles; and it was found, that this small pendulum of the said length was isochrone to the vibrations of those wooden circles, according to Monsieur HUYGENS's rule.

^r Mr. HOOKE in a letter to Mr. BOYLE dated December 15, 1664, and printed in Mr. BOYLE's Works, vol. v. p. 513, says, "We had yesterday from several parts of England an account of the appearance of a very great comet in the south-south-east, with a very long tail extended to-

"ward the north west, some say about ten yards
"long, some about two; but how much that is,
"is difficult to guess, unless we could see it, which
"I have done all this last night, but to little purpose, by reason of the thickness of the air."

Sir WILLIAM PETTY, Dr. WILKINS, and Mr. HOOKE were desired to repeat by themselves in a very still room Monsieur HUYGENS's experiment for the universal measure; the experiment made twice in public having varied from his rule by $\frac{1}{16}$ the first time, and $\frac{1}{16}$ and $\frac{1}{16}$ the second time.

Mr. HOOKE was ordered again to attend the president at his house for adjusting the pendulum to vibrate seconds, it being doubted, whether the note of the preceding meeting about that particular was rightly taken.

He was likewise ordered to make a short pendulum, as best for keeping the time exactly.

The proposal for planting timber and fruit-trees was ordered to be recommended to such persons of the Society, as were members of the parliament.

Mr. BOYLE gave the Society an account of some experiments and observations made by him at Oxford. The first was tried upon a dog, by making a hole in each side, big enough to put one's finger in, in such a place, where the finger might reach the nerves, that go to the diaphragm; one of which nerves being broken with the finger, the dog immediately fell into a swoon, and seemed to be quite dead; but after a while recovered by degrees, having many convulsive motions about the mouth, when he was well come to himself again. The nerve on the other side being broken, the dog presently fell into universal convulsions, and immediately died in them. The cause of which, as Mr. BOYLE conceived, was not the wound in the thorax, which was but small, and shed but little blood; so that at the same and at other times too, he kept dogs alive several days with a greater wound in the thorax; nor was there, added he, any rupture in the pericardium, from which these nerves pass, as he found by dissection afterwards.

Another experiment was that, which he had communicated by letter taken notice of in the journal of the preceding meeting, and farther to be prosecuted by him.

A third was of putting volatile and acid salts into warm sheep's blood; the effect of which was, that the volatile ones, as spirit of sal armoniac, urine, and hart's-horn, render the blood florid, and keep it uncongealed and sweet, as long as one pleases, heightening also the colour. Spirit of wine doth the like, but without heightening the colour. Oil of turpentine likewise being shaken with the blood preserved the colour, and kept the blood sweet, but not like the former. On the contrary, acid spirits, as that of salt and of nitre, being in a small quantity put into the blood, and shaken therewith, coagulated it immediately, and changed it into a dirty colour.

The experiments appointed for the next meeting were of refractions and pendulums.

December

December 28. At a meeting of the COUNCIL were present,

| | |
|------------------------------|----------------|
| The lord viscount Brouncker, | Mr. PALMER. |
| president. | Mr. HENSHAW. |
| Sir ROBERT MORAY. | Dr. GODDARD. |
| Sir PAUL NEILE. | Dr. CLARKE. |
| Sir JOHN LOWTHER. | Dr. BALLE. |
| Sir WILLIAM PETTY. | Mr. COLWALL. |
| Mr. SLINGESBY. | Mr. GRAUNT. |
| Mr. AERSKINE. | Mr. OLDENBURG. |

The council approved of Mr. HOOKE as curator, in order to recommend him to the Society as such; and it was ordered, that the president be desired to recommend Mr. HOOKE from the council to the Society at their next meeting as curator by office: And

That the amanuensis cause bills to be printed for summoning the Society on the 11th of January for the election of a curator, and that the operator carry such bills abroad accordingly.

At the meeting of the SOCIETY on the same day before that of the council, Sir WILLIAM PORTMAN and Sir WINSTONE CHURCHILL were elected.

Sir ROBERT MORAY produced his own and Mr. SLINGESBY's observations on the comet, which they were desired to continue; and other members to do the like. Sir ROBERT communicated likewise some observations on the said comet made at Doway and Bremen; as also some that were made in Wiltshire from November 13 to December 17.

Dr. PELL, upon occasion given by Sir ROBERT MORAY, mentioned, that he had at his country-house in Essex a wooden hoop, made by his directions in the year 1645, of twenty inches broad, representing the ecliptic, and at Amsterdam by Mr. BLEAU lined with as much of the paper of Mr. BLEAU's largest globes, as comprehends all the fixed stars within 10 deg. of the ecliptic on either side, but with the constellations inverted, as they stand in the heavens; the use of this being not only to help young observers, but also for the genuine representation of the variety appearing in the motion of the planets.

He mentioned, that he was willing to leave it with the Society, when they should have a fit repository to keep such instruments in.

An experiment was made with a circular plane, hanging by a string of $17\frac{1}{2}$ inches, the radius of the circle being 9 inches; so that the distance from the center to the point of suspension was $26\frac{1}{2}$ inches. Which being calculated by Mr. HOOKE, according to his rule, gave the distance from the center of vibration to the point of suspension $27\frac{1}{2}$ inches, whereas it should have given $28\frac{1}{2}$ inches.

Mr.

Mr. Hooke acquainted the Society, that he had been adjusting at the president's house the pendulum vibrating seconds; and that his lordship and he, though measuring by the same string, yet could not determine the exact length, because the string broke, which made them differ, his lordship finding 39 inches wanting $\frac{1}{16}$, but Mr. Hooke 39 $\frac{1}{16}$ inches.

Mr. Hooke brought in his observations of the comet on December 23 in writing; whence he concluded, that this was the same star, that had appeared about a week before. He added, that it seemed to be a body, that was dissolved in the æther; and that the parts, that were dissolved, ascended from its body directly opposite to the sun, or from the gravitating center of the planetary system, after the manner, in which smoke from a burning body ascends upwards from the center of the earth. He exhibited also a scheme of the hypothesis, whereby he conceived, that all the irregular motions of the star towards the west, which it had hitherto been observed to make, might be explained by the motion of the earth, without ascribing any or but very little motion to the comet. He was ordered to continue his observations with all diligence and exactness, and to see, whether they and those of others would all agree with the said hypothesis, and to bring in an history of all in writing.

Mr. BOYLE's late anatomical experiment of breaking the nerves going to the diaphragm, and thereby killing a dog, being mentioned again, he was desired, together with Dr. CLARKE, to see the experiment made before the Society; and the operator was ordered to provide a pretty large dog for that purpose.

With regard to the other experiment made by him of cutting in dogs the sixth pair of nerves, he desired time to pursue it, before he gave a farther account of it.

The operator brought in writing his observations of the baroscope, made by him for the space of a whole year; which was referred to the next meeting.

End of the First VOLUME.

ERRATA:

Page 1. note (c) col. 2. line 2: for *peragrānus* read *peragrānus*. Page 3. paragr. 2. line 3. for *at* read *and*. Page 99. line 9. for *Робат* read *Робит*.

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